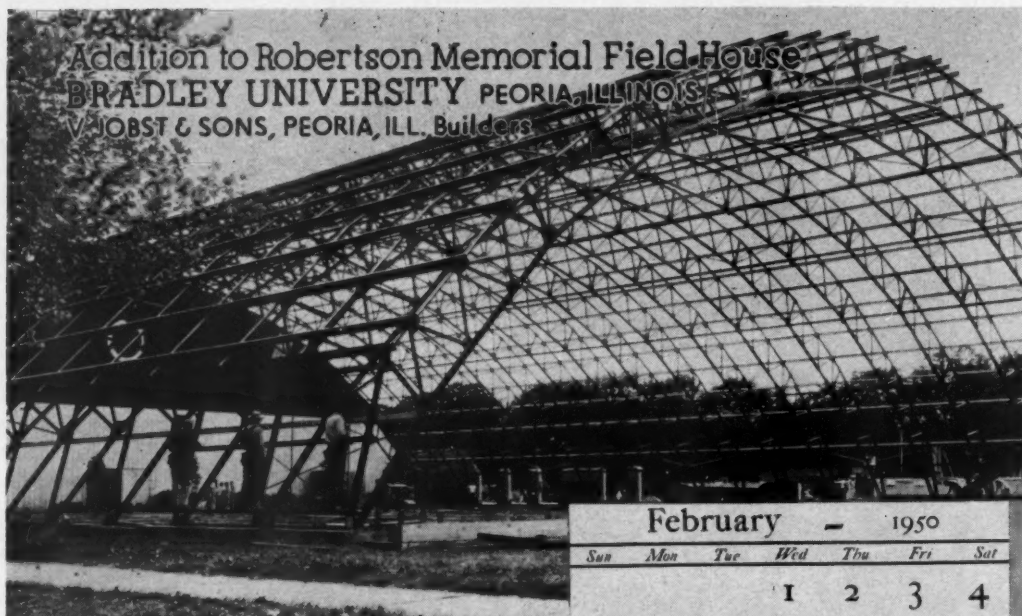


Midwest Engineer

SERVING THE ENGINEERING PROFESSION



**WATER SUPPLY IN THE CHICAGO METROPOLITAN AREA
THE BANKER—THE ENGINEER—AND THE CONTRACTOR
WSE MEETINGS—PAGE TWO**



Addition to Robertson Memorial Field House
BRADLEY UNIVERSITY PEORIA, ILLINOIS
 V. JOBST & SONS, PEORIA, ILL. Builders

STRUCTURAL STEEL FABRICATED BY
MISSISSIPPI VALLEY
STRUCTURAL STEEL CO.
 CHICAGO DECATUR ST. LOUIS PLINT



February — 1950						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

HORTON ELEVATED STEEL TANKS



Elevated steel tanks, like the one shown at the left, provide gravity water pressure in systems supplying water for general service and fire protection at industrial plants and municipalities. In small systems the tank is used to supply water directly, the tank being filled intermittently by pumping. In large systems the tank rides on the distribution mains, supplying the increased flow of water needed at peak demand periods. The tank is elevated above the ground to a height sufficient to give an adequate minimum pressure.

We fabricate and erect elevated tanks in standard sizes from 5,000 to 2,000,000 gallons and special designs to meet your requirements.

The radial-cone bottom design, illustrated at the left, is particularly adaptable to tanks of large capacities, where a conventional self-supporting bottom would make necessary an excessive range in head. Installations of 500,000 gallons or less are usually of ellipsoidal bottom design.

Left: 1,500,000-gallon radial-cone bottom elevated tank at East Chicago, Ind. It is 85 ft. to the bottom.

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MIDWEST ENGINEER
Published Monthly
except June, July, August by
THE WESTERN
SOCIETY OF ENGINEERS
at
2207 Dodge Avenue
Evanston, Illinois

The Society does not assume responsibility for
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Single copy\$.35
Annual subscription 3.00
Foreign subscription 4.00

Entered as second-class matter September 23,
1948 at the post office at Evanston, Illinois
under the Act of March 3, 1879.

MIDWEST ENGINEER

A Publication of the
WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession



February, 1950

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COVER CREDIT

Illustrative of Chicago's water supply is the old water tower, shown on our cover. When Fort Dearborn was settled in 1803, the Chicago River provided the community water supply. Many people purchased water from peddlers who sold their wares from open barrels.

The water tower, built in 1867 despite the shortages of materials and of men in civilian life caused by the Civil War, withstood the Great Fire of 1871 and still stands at the intersection of Michigan and Chicago Avenues, no longer in use. The tower is a symbol of Chicago's past, signifying the great faith of her early citizens in their city's future, a monument to the vision and skill of engineers of a pioneering era.



February 6, Prestressed Concrete

**SPONSORED BY BRIDGE AND STRUCTURAL SECTION
AND AMERICAN SOCIETY OF CIVIL ENGINEERS**

Blair Birdsall, assistant chief engineer, Bridge Division, John A. Roebling's Sons Company, will speak on "Americanized Prestressed Concrete," Monday, February 6.

He will discuss his company's studies of the problems of prestressed concrete, particularly as they relate to wire and wire products. Their aim has been to find the proper type of wire, strand and cable to use in prestressed concrete, and also to find the method of application of these materials to be consistent with American construction practices.

Mr. Birdsall is a graduate of Princeton University with the B.S. and C.E. degrees. He joined the Roebling firm in 1934, assisting in engineering designs in connection with bridge contracts, including the Golden Gate bridge, on which he was field engineer. He rose to his present position in 1940.

February 7, Building Code

Joint dinner meeting with discussion of Chicago's new building code, 6 p.m., Bismarck Hotel. Reservations—Chicago Assn. of Commerce and Industry.

March 6, The Mechanical Rectifier

SPONSORED BY THE ELECTRICAL SECTION

Otto Jensen, manager of the Rectifier Division of the I-T-E Circuit Breaker Company, will speak Monday, March 6, on the subject, "The Mechanical Rectifier."

He will describe the basic operating principles of the mechanical rectifier and will tell the story about how this device was obtained in Germany at the end of World War II. He will describe the two major installations of the rectifier made in this country.

Mr. Jensen graduated from the Technical Engineering College in Copenhagen, Denmark, in 1919. He has been associated with the Western Electric Company (Hawthorne Works), Sargent and Lundy, and has been with the I-T-E Circuit Breaker Company since 1928 in various capacities. He was appointed manager of the Rectifier Division in 1946. He is a member of A.I.E.E. and of the Electro-Chemical Society.

February 9, Educational Courses

Courses offered by General Education Committee begin. See Page 23 for details.

February 13, Distillation

SPONSORED BY THE CHEMICAL AND METALLURGICAL SECTION

Richard J. Schoenenberger, an engineer with Podbielniak, Inc., will speak on "Precise Fractional Distillation Analysis with the Podbielniak Hyd Robot and Hyper Cal Apparatus."

He has been associated with Podbielniak, Inc. for ten years in development, design and construction of distillation and absorption apparatus and centrifugal contractors, which are extensively used in the petroleum, pharmaceutical, soap, food, chemical, essential oil, vegetable oil, plastics, paper, paints and other industries throughout the world.

February 20, Communications

**SPONSORED BY THE COMMUNICATIONS SECTION AND THE
ARMED FORCES COMMUNICATIONS ASSOCIATION**



Rear Admiral John R. Redman, USN, Chief of Naval Communications, will speak before a meeting sponsored by the Communications Section and the Armed Forces Communications Association, on the subject, "Navy Cooperation with Industry in the Communications Field," Monday, February 20.

Admiral Redman had an outstanding record during World War II in the Pacific fighting. He served for three years, October 1942 to April 1945, as communication officer on the staff of Fleet Admiral Chester Nimitz, commander-in-chief of the Pacific Fleet. From May 1945 to January 1946, he commanded the battleship USS Massachusetts, which was in the thick of the Pacific sea fighting. He is a graduate of the Naval Academy, class of 1919.

The Armed Forces Communications Association is a national society of more than 10,000 citizens, pledged to preparedness against war, in the communications and photographic fields. Membership or participation is open to all citizens who have an interest in communications and photography, from the scientific, industrial or military viewpoint, with the aim of contributing to security and peace.

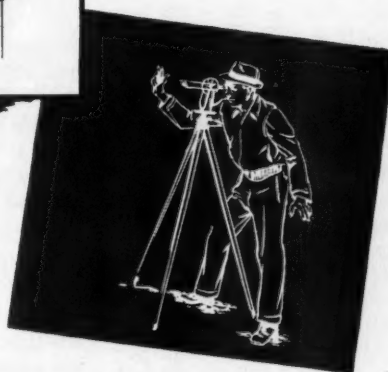
February 27, Washington Award

The Washington Award of 1950 will be presented to Wilfred Sykes, chairman of the executive committee of Inland Steel Company, at the Washington Award Dinner on Monday, February 27, at the Furniture Club of America, 666 N. McClurg Court. For details, see page 15.

the banker,

the engineer,

and the contractor



By Guy C. Kiddoo, Vice President, First National Bank of Chicago

A banker very seldom has an opportunity to tell engineers anything. Usually it is the other way. The engineer tells the banker—or his customers which amounts to the same thing—what can or cannot be done and how and why. So it is a rather unusual experience to be asked to write something for the engineers about the construction business from the banker's point of view.

The engineer practices an exact profession. He deals with definite standards and exact units of measurement. He relies on carefully developed formulas for the resultant effects of known causes. He can measure stress and strain and definitely forecast their results.

The banker, however, deals principally with intangible factors which cannot be so readily analyzed and measured, and the results of which are not easily foreseen. In extending credit to the contractor, the banker must rely on many things which can't be measured by the

dollar sign or listed as assets on a balance sheet. And yet, these are the things which very largely determine whether a construction project will produce a profit.

Both engineer and banker perform an important function in the construction industry. The engineer has developed the machines and processes which have brought our country to its preeminent position in productive capacity and living standards. The skyscrapers, utility plants, tunnels and sewers, without which our great cities could not function, and the dams that conserve and utilize our great water power resources are typical of the contributions that the engineer has made to the physical development of our country.

The banker's function is much less spectacular and important, and yet the credit which the banker provides facilitates the combinations of equipment, material and manpower required to car-

ry on large public works. And the banker provides the conduits through which flow much of the credit for the construction of homes.

It has been my lot for a number of years to handle accounts of those engaged in all phases of the construction industry, in a bank which probably does more business with contractors than any bank in the country. Out of this observation and experience the following comments and suggestions are offered in the hope that they may be of some value to those now operating as contractors and perhaps to some engineers who may aspire to extend their activities into that field.

Let us consider some of the things the banker considers in lending money to contractors, which is not a simple or easy credit field. The financial statement, of course, is a necessary starting

(Continued on Page 4)

The Banker, the Engineer And the Contractor

(Continued from Page 3)

point. There is little uniformity in accounting among contractors and to analyze a statement intelligently the banker must get enough detail to know how the figures have been put together. While a statement certified by an independent public accountant is desirable, CPA's don't always agree on how such statements should be set up, and the banker cannot rely entirely on an auditor's certification.

Points To Be Considered

Are profits taken as the work progresses, or only on final completion? Are income tax reserves adequate? Are equipment write-offs large enough to leave only a realistic salvage value for rusty iron when the job is done? Was the bid unbalanced to show larger earnings in the earlier stages than will be realized later? Will there be move-out and clean-up costs to be met at the finish? Are the receivables or earned estimates the amounts approved by the owner's architects or engineers, or do they include additional amounts based perhaps more on hopeful guesses than on carefully measured progress?

Supplementing the balance sheet, the banker will usually want a schedule of uncompleted contracts showing the nature of the work, the size of the contracts, the amount completed to date and remaining to be done, the amounts of retained percentages and earned but unpaid estimates on each job, and the final completion dates.

On larger contracts the banker may want a job progress report. This should be in effect a balance sheet showing the investment in the job (which, of course, will include equipment and plant cost), the deferred charges, the retained percentages and earned estimates and any material inventories, and a profit-and-loss statement showing cost of work done to date, compared, if possible, with the bid estimates.

On new work which requires credit, if the case is marginal, the banker may want a detailed breakdown of estimated costs. This will show the amounts for materials and subcontracts in which

there is not the risk there is in the work to be done directly by the contractor. These figures will also show the allowances for equipment write-off and contingencies and other factors helpful in estimating the credit risk.

In addition to and beyond what can be learned from financial statements and schedules, the banker must consider other things. What has been the contractor's experience as to kind of work and operating area? This business can't be learned out of a book and there may be added risk if the contractor feels the grass is greener across the fence and wants to take work in new and unknown fields.

The amount of work it is safe to take on must be reasonably related to financial resources. Diversification of risk through a number of different jobs is desirable without scattering the contractor's attention and efforts too much. Sometimes the rule of thumb, limiting work to 10 times working capital, may be disregarded, but only after a careful appraisal of all pertinent factors.

Dun & Bradstreet, Inc., compile statistics of profits and operating ratios for various lines of business. In 1948 their figures show that 149 building and construction contractors turned over their net worth an average of about 5½ times and their net working capital almost 8 times. The financial statements in our files show that building and general contractors who are highly efficient often perform, in a single year, work amounting to considerably more than 10 times their net working capital. Contractors in this class usually have 90%, or at least 80%, of their net worth represented by working capital.

Mechanical and trade contractors do not turn their working capital as rapidly as the building and general contractors, and road contractors turn their working capital even less rapidly, and have substantially smaller percentages of their net worth in working capital. Contractors in the heavy engineering field show a wider variety in figures between individual companies and from year to year, but the ratio of work performed to working capital is smaller and generally their investment in fixed assets is larger than in most other construction lines.

Large public contracts often are too big to justify a single contractor assuming the risk. Joint ventures between two

or more contractors have the advantage of furnishing independent cost estimates and the varied experiences and abilities of different contracting organizations.

Analyzing the Bid

How does the contractor prepare his bid? Taking contracts too cheaply is the principal reason (more important than all the others together) why contractors get into trouble. The contract should be clear and the specifications definite and reasonably possible to meet. If there is any question about their meaning, the contractor should not bid, or bid high, rather than take a chance on a favorable interpretation after he gets the job.

The bidder must know the up-to-date costs of the various operations involved; and a standardized method for preparing a bid with a complete check-list of all cost factors affords some protection against error.

Adequate provision must be made for equipment rental or write-off, especially now when new equipment costs so much. The contractor can't pay his income taxes, to say nothing of material bills or bankers loans, with worn out equipment.

An important factor influencing bidding now, which is hard to measure, is the future trend of material prices and labor costs. The contracting business is very largely a depression-proof business, because in taking lump-sum contracts the contractor is selling material and labor short, and in a falling market can cover his commitments at a profit.

Need Adequate Margin

During and immediately following the war the contractor was swimming against the tide of increasing labor and material costs, but beginning in late 1948 and running pretty well through 1949 the tide turned and ran in his favor. In the past year labor was more available and efficient and there was a declining price trend in materials and supplies; and the weather generally was good for construction work. Most of the work completed in 1949 had been bid with an adequate margin for contingencies and profit.

While the trend of costs has been downward in the last year or so, there is considerable doubt as to whether or how long this trend will continue. The

recent increases in labor costs in such basic industries as steel, coal and transportation and the general additional fringe benefits in all fields will probably not be offset by any further increase in productivity of labor.

Many contractors suffered heavy losses on veterans' hospital contracts taken near the end of the war when bidders thought that following the end of the war we would have eight million unemployed and surplus of material with lower prices. While the competition among producers and fabricators of construction materials is great and may hold back for some time the upward trend in prices, it would seem dangerous for the contractor not to take into account the possibility of further cost increases. This is especially important when bidding jobs that may require more than one operating season for completion.

Be Wary of Competition

It is dangerous for the contractor to permit competition, real or fancied, to reduce his bid, although occasionally it may be raised if competition is weak. It looks like some recent jobs have been bid on a very tight basis. This has perhaps been due somewhat to the good results on recent work, the fear of a lesser volume of work, and the need for a large volume to carry an enlarged organization. Profits may be smaller in the next year or two than they should be.

How much should be added at the bottom of the sheet for profits is always a tough question on which the banker can be of little help. Only once in a lifetime is it possible—although it did happen once—to insist that a bid on a \$1-million job be raised \$93,000 as a condition for getting a bid check (over the violent protest of the contractor who thought he was being put out of the way for some other contractor) and then have the contractor get the job \$700 low.

Dun & Bradstreet statistics show that in 1948 the average net profit obtained by 149 contractors was 3.76% on completed work. This was a smaller percentage of profit than was made in the following lines: automobile parts and accessories, industrial chemicals, confectionery, cotton cloth, drugs, electrical parts and supplies, foundries, hardware and tools, hosiery, industrial machinery, metal stampings, paints, varnishes and

lacquers, paper, paper boxes, job printers, stoves, ranges and ovens; and any fair-minded jury would agree that the hazards and risks of the contracting business and the experience and ability required in it, justify fully as large net profits as in any of these other fields.

The banker who loans money to a contractor must know not only that the contractor bids soundly, but that he does the work well and economically. The best way to learn this is to get out and look over the contractor's work in the field. The banker will get a general impression as to the quality and ability of a contractor's personnel by seeing them at work and can get valuable background information and impressions by seeing his customer's equipment and house-keeping. The banker who knows what a D-8 or a walking dragline is, and who has seen enough jobs to know in general the character of equipment required for certain work, will have a more sympathetic understanding of the funds needed to equip a job and get it started.

Work sublet should be only to good subs who can be relied upon for performance, and at prices that will let them live, and, if there is any doubt about their financial responsibility, they should be bonded.

A construction job can't be run from an arm chair. The contractor who gets mud on his shoes and cement in his ears is a better risk than a push-button executive. The construction business needs the vigor of youth and any large volume of work requires capable and competent men, who can usually best be had by letting them share in the profits of their work.

A job must be properly equipped, especially in these days of high labor cost. Equipment must be well maintained with adequate reserves and replacement parts to prevent loss of time from shutdowns while equipment is being repaired. The up-to-date contractor must continually study and compare costs and efficiency of new equipment. Money properly spent for plant and equipment may be the best assurance of ultimate profit.

In reviewing the contractor's field operations, the banker will want to check the system he uses to know how costs compare with his bid estimates, so that corrective steps can be taken if necessary.

The successful contractor must be

something of a diplomat and skilled negotiator. Friendly relations with material suppliers, sub-contractors and labor leaders are very important to the smooth performance of a job. The contractor should get written authorization for changes or extras. The one who frequently finishes a job with a dispute as to the amount due him, is a poor credit risk. Litigation to settle such differences, particularly with public authorities, is costly, lengthy, takes the contractor's time and energy, and usually benefits only the lawyer.

The contractor who competes for work only in open competition or arms-length negotiations is usually a better operator and a better credit risk than one who relies for success on influence or favor.

One of the most unfortunate experiences I have had in financing contractors arose out of a situation where two young and ambitious men had succeeded their fathers in the management of their respective firms and had joined together in attempting to obtain the award of a municipal contract. They were told by intermediary or intermeddling fixers that they could obtain the award of the contract if certain parties were "taken care of." They unfortunately fell for this line and the net result was the suicide of the father of one of them, prison terms for both of them and heavy financial loss. I am glad to say that both of these young men learned a valuable lesson from this experience and are today successful and valued customers of our bank.

Here are a few tips on banking arrangements and relations. Credit lines for contractors must be elastic. They cannot be set up in the same definite dollar amounts as for most manufacturing and merchandising concerns. The contractor's credit needs depend on many variable factors that he cannot fully foresee at the beginning of an operating season, and credit lines should be set up to provide whatever money is needed for the volume and kind of work the banker has approved.

Ordinarily, credit to a contractor is unsecured, although if the borrower is a wholly- or closely-owned corporation, the personal guaranty of the principal owner may be appropriate. When the

(Continued on Page 6)

Chicago Area Water Supply A WSE Symposium Presented December 19, 1949

1. The Ground Water Conditions in the Region

Illinois State Water Survey

A. M. Buswell, *Chief*

Max Suter, *Head, Engineering Research*

H. E. Hudson, Jr., *Head, Engineering*

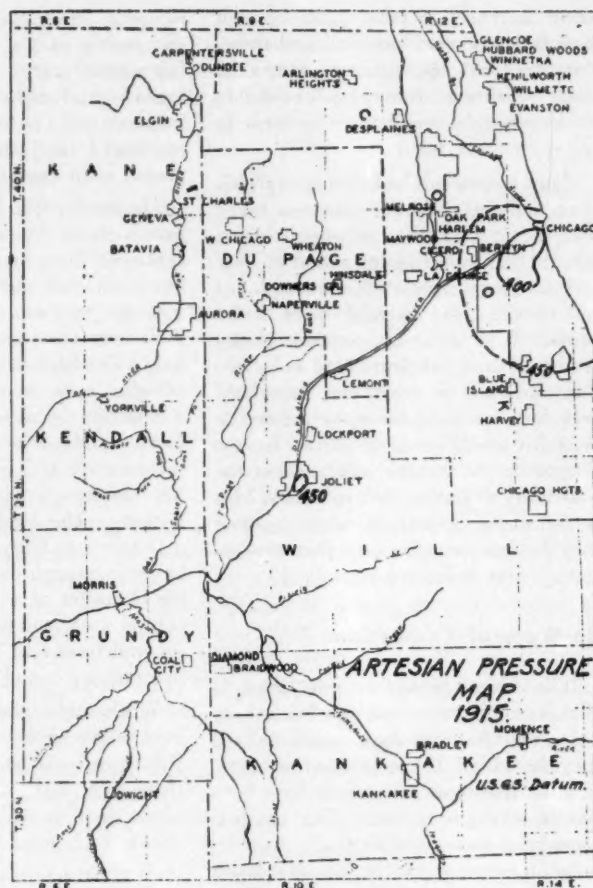


Figure 1

In the Chicago area as in most areas where ground water use is large, the biggest use of the water is for industrial purposes. Table 1 shows the division of uses of water in the area.

This table shows that great quantities of water are used in industry. Table 2 shows the quantities of water required for some individual industrial processes. Some of these uses, such as water used for testing airplane engines, and for generation of electric power, are not water-consumptive processes, inasmuch as they use, as a rule, surface water which is returned almost entirely to the source after being warmed up two or three degrees Fahrenheit. Many operations, however, require extraction of cool ground water which is not returned to the source.

Figures 1, 2, and 3 are maps of the water levels in wells, which are sometimes called piezometric surface maps or artesian pressure maps. Figure 1

illustrates the water levels (expressed in feet above mean sea level) in 1915. Figure 2 shows the artesian pressures in wells drilled in the deep sandstones as of 1944. It will be noted that a considerable lowering has taken place in the levels, with the deepest levels in the vicinity of the western and southern parts of

Chicago, Joliet, and an area south of Joliet.

By 1949, as seen in Figure 3, the area of lowest water levels had changed to some degree to correspond to the shift of the Chicago center of pumpage. During the past six years, pumping increased by three million gallons per day

Table 1. 1945 Groundwater Pumpage in the Chicago Area

Use	Million Gallons Daily
Public Water Supply	36.3
Air Conditioning	1.6
Steel and Metal Plants	9.3
Food and Packing Plants	24.3
Chemical Plants	6.7
Railroads	1.6
Other	4.7
Total	84.5

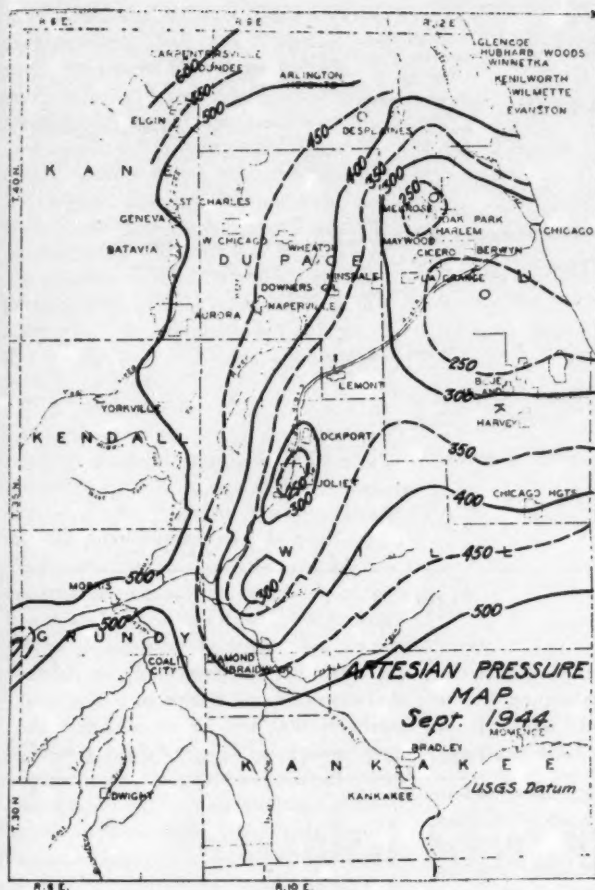


Figure 2

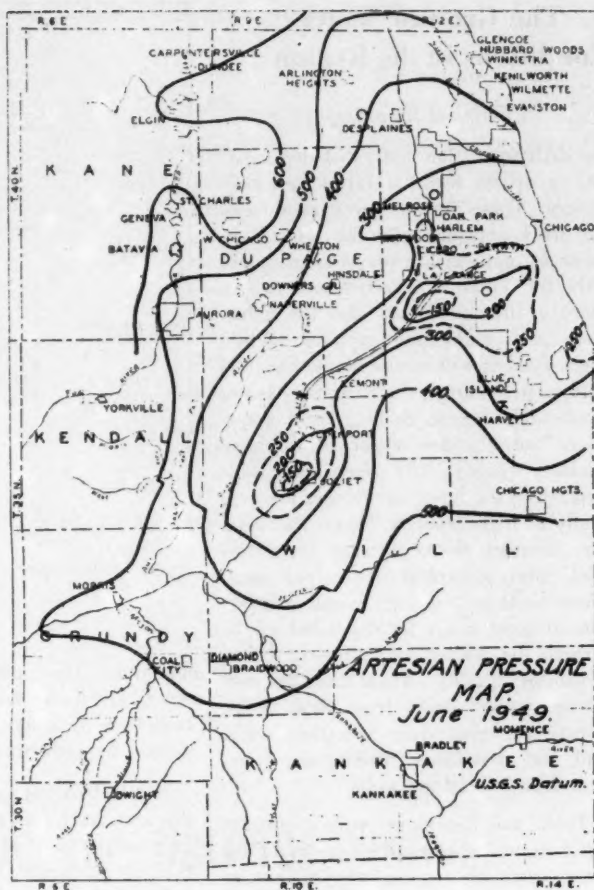


Figure 3

to the west of Chicago, and the water level recession rate increased from eight feet per year to ten feet per year.

Ground water from the deep sandstones has two peculiar virtues. It has nearly constant temperature, which makes it particularly well suited for industrial uses where waters of approximately 60°F. are required. The only substitute for this source of high grade heat-absorbing capacity is mechanical refrigeration which requires much greater investment costs.

The other major virtue of ground water is its freedom from contamination. The waters of the deep sandstone are protected by vast thicknesses of impermeable materials, which safeguard them from chemical and bacteriological pollution. Unrestrained abandonment of bores that penetrate deeper formations yielding salty waters are in certain instances in the Chicago region causing

the movement of saline waters from those formations upward into the major producing sandstones. At the present time there is little evidence of contamination from the surface.

Should atomic bombs ever be used to attack municipalities or industrial centers, Chicago would be an important target. Use of atomic bombs for this purpose could very possibly cause a serious contamination of Chicago's drinking water supply taken from Lake Michigan. It is almost beyond the realm of possibility for atomic explosions to cause the contamination of the deep sandstone aquifers. They constitute therefore, a reserve drinking water source adequate to supply any emergency needs of the population of the region, so long as these waters are within reach of reasonable extraction procedures. Possibly this reserve should be earmarked as an emergency supply of National significance.

During the past 60 years there have been nine investigations of the feasibility of distributing Lake Michigan water to the communities surrounding Chicago. Without exception, these investigations have shown that it is economically practicable to make lake water available for municipal systems. The desire for local autonomy and plain inertia have been major forces contributing to the rejection of each of these plans.

The State Water Survey has been conducting a ground water investigation in the Chicago area since 1942. During the last year, water level observations were made on 316 wells of which 31 were equipped with recording instruments. Pumpage data were obtained from 321 wells and special pumping tests were made on 10 wells.

In this territory there are three principal types of wells. (1) The wells in
(Continued on Page 8)

1. The Ground Water Conditions in the Region

(Continued from Page 7)

the drift formation consist of dug, driven, or drilled wells at farms and residences. These are the lowest producers. (2) Rock wells drilled in the upper limestone formations are very common, not only for farms and residences, where there is little drift, but also for industrial and municipal supplies. While their yield is sometimes more than 500 gallons per minute, their capacity is not predictable before drilling, and sometimes they furnish water of doubtful sanitary quality. (3) Deep rock wells penetrating the lower sandstones are generally of high capacity. They are therefore the main source of water for industrial, and suburban municipal uses. These wells have a high initial cost but can in most cases be depended on to furnish the desired quantities of water of sanitary quality. About three per cent of the water comes from drift wells, twenty per cent from limestone wells, and the remaining seventy-seven per cent from sandstone wells.

Drift and limestone wells penetrate aquifers which usually receive their water vertically from nearby surface infiltration and vary to some extent in yield and water levels with local rainfall.

The deep sandstone wells are of the artesian type, whose water is from original storage in the formation with a very slow lateral recharge from distant outcrops of the water bearing strata.

How much water can be taken from underground in the Chicago region? No calculations have been made for the drift and limestone wells, but the calculated amount for the sandstone is readily available. Using the contour lines shown in Figure 3, calculations based on the permeability of the formations, and the hydraulic gradient, lead to the following estimates.

The inflow of water into the area within the 400-foot (above MSL) contour was calculated to be 50 M.G.D. The quantity of water being pumped from the sandstones within the same area was 60 M.G.D. during 1949. These data indicate that the Chicago region within the 400 contour is extracting about 20 per cent more water than is moving into

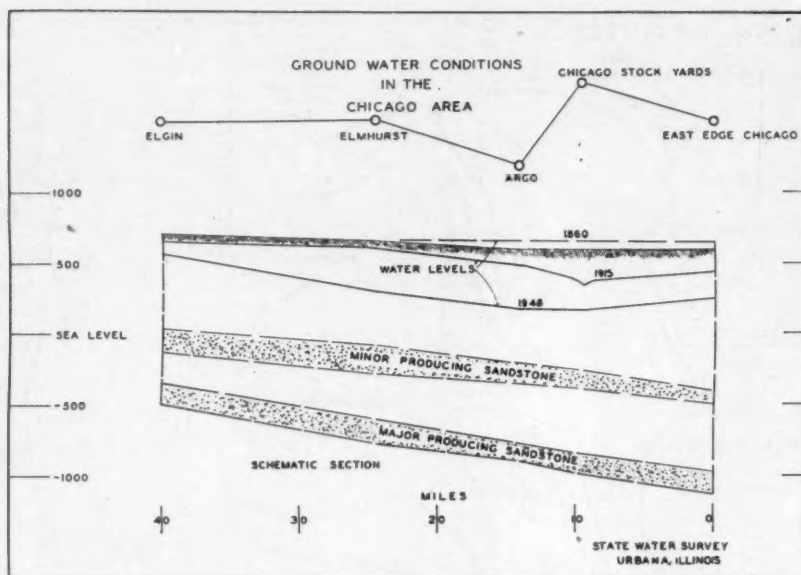


Figure 4

the area. This indicates that there is not likely to be any slackening in the recession of water levels unless it be caused by reduction in total pumpage.

Until 1915 the pumpage increased in the area at a rate of about 0.6 million gallons per day every year, but after that the increase in pumpage rose an average of about 1.7 million gallons per day every day every year until about 1940. Since then the total areal pumpage has shown little increase; in fact, since 1946, it has shown a slight decrease. Detailed studies show also that the center of the heavy pumpage has moved west in recent years because in the city of Chicago and the suburbs many ground water uses were replaced by lake water.

Need Adequate Planning

Many of the difficulties which have occurred in municipal and industrial ground water supplies in the Chicago region have been due to lack of foresight. Trends in ground water conditions have been ignored, so that adequate planning was not made for conditions that could readily be predicted.

In an area where ground water is being overpumped, as it is in the Chicago region, it is necessary to lower well pumps at intervals, and to provide new equipment to meet the deeper water lev-

els. Work is now proceeding on the installation of some pumps in this area at levels of 800 feet or more below the ground surface. It is not difficult to visualize the mechanical problems involved in such installations, and the great costs of operation and maintenance of units placed further below the ground surface than the height of Chicago's tallest building.

Some industries and municipalities have failed to plan for the lowering levels, thus encountering water shortages. This is a situation very similar to that which faces New York City at the present time, where the shortage was clearly foreseen, but was ignored by the City Administration.

Difficulties due to overpumping do occur with all kinds of wells, but in drift and limestone wells the difficulties are more often due to mechanical defects in the well construction; whereas in the deep sandstone wells they are due to receding levels brought on by the heavy pumpage, wide area of interference between wells, and the slow recharge inflow. Only the latter type of difficulty is of major importance in the Chicago area and it has therefore received concentrated study.

Data found in old records throw an interesting light on the development of the ground water sources. These old records show that the first deep sand-

stone well was drilled in the Chicago area in 1864. This was a flowing well with pressure 80 feet above ground. As more wells were drilled and pumpage increased, the artesian pressure was lowered and by 1900 most of the deep wells ceased to flow above ground. This did not hinder further development, and levels continued to drop until now the non-pumping water levels in the sandstone wells are 300 to 450 feet below the ground level. In the Chicago area this lowering of the water levels has been at the average rate of about six feet per year since 1900.

It is plain that the Chicago region is using its deep sandstone supplies at a rate greater than their ability to furnish water. The future course of water levels can readily be charted. The expiration date of this resource can be predicted. There are means available to halt the destruction of this resource and to make it available as a reserve for important needs. A problem faces us. We know its solution. When will we apply it?

Table 2. Industrial Requirements for Water

Industry	Unit	Water Required Gals. per Unit
Airplane engines	To test one engine	50,000 to 125,000
Gasoline	Gallon	7 to 10
Beer	Barrel	470
Whiskey	Gallon	80
Canning vegetables	Case of No. 2 cans	25 to 35
Canning fruits	" " " " "	55 to 65
Canning spinach	" " " " "	160
Coke	Ton	3,600
Fabricated steel	Ton	42,000
Beet sugar	Ton of beets	3,100
Packing house	Hogs, per animal	550
" "	Cattle, " "	2,200
Air conditioning (Freon type)	Ton of refrigeration	50 to 250 for 60°F. to 90°F. water
Pulp and paper mills	Ton of pulp	50,000 to 150,000
Tanneries	Lb. of hide	3 to 8
Dairies	Quart of milk	3
Electric power	Kw. Hr.	80

Chicago Area Water Supply

2. The Critical Situation in the Outlying Sections

Arthur W. Consoer, Consoer, Townsend & Associates, Consulting Engineers

In 1888 a deep rock well was drilled into the Potsdam Sandstone on the site of Tribune Tower. At that time it was a free-flowing artesian well. There is no record of its depth or yield.

The Wanger Company at Harvey, Illinois, in 1891, obtained a free-flowing well with a depth of 2,075 feet.

In Graceland Cemetery in the year 1895 a well was drilled to a depth of 1,540 feet into the Dresbach Sandstone, which 55 years ago discharged a considerable flow of water under pressure without a pump.

No records have been located by the writer regarding free-flowing wells drilled after 1895 in or near Chicago.

A well was drilled in Blue Island in 1896. At a depth of 1,025 feet, static water level in the well was 60 feet below the ground, and at a depth of 1,632 feet, the static level was 61 feet below the ground.

For a well drilled for the Manhattan Brewery Company in Chicago in 1897,

it was necessary to install a pump to get a supply of water.

In 1898 the static water level was 32 feet below the ground in a well drilled for the Columbia Malt Company in Chicago.

The same year worse luck was experienced by the American Malting Company on the far northwest side of the City with static level when well was not pumped, at 60 feet below the surface of the ground.

In 1898 too, the Northwest Malt & Grain Company developed a well 1,534 feet deep with static level of 58 feet.

In 1901 the Clearing Industrial District was pleased to get a well at a depth of 1,601 feet which produced 475 gallons per minute with static level of 106 feet.

The static level in 1905 was 120 feet below the ground in a well drilled to a depth of 1,620 feet by the White Eagle Brewing Company, and it was then obvious that static water levels in deep rock

wells in the Chicago area were definitely receding.

During the past 40 years the recession has, on an average, been from 7 to 8 feet per year in static water level. Average pump settings today are about as follows:

In the Bellwood-Elmhurst area—500 feet.

In the Joliet area—500 to 550 feet.

In the Kankakee area—530 feet.

In the vicinity of Argo—825 feet.

In the vicinity of Chicago airport—680 feet.

Maximum depth of pumping setting must be worked out from the economics of the situation involved. Ordinarily the lower the setting the greater the yield and the higher the operating costs.

For oil wells, settings of 3,000 to 4,000 feet are common but these are low capacity wells, and do not utilize turbine pumps, but use some improved type of plunger pump. The deeper you go with

pump settings, the more reserve units you need to provide safety of operation.

An 800 foot setting seems to be entirely feasible from the standpoint of pump manufacture and well-drilling operations and probably will be realized for municipal supplies in the Chicago Metropolitan Area before effective measures are taken to obtain a supply of Chicago water in many of the suburban towns west and southwest of Chicago.

Some of the railroads have set turbine pumps as low as 900 feet to 1100 feet, but no other similar instances are known to the writer.

Difficulties in following the water on down in a deep rock well are:

Most casings in old wells are too small.

Many old wells were finished 4 to 5 inches at the bottom.

Crooked bores.

Where the alignment is bad, a deep setting for a turbine pump is not possible.

The cost of increasing the bore in an old well can exceed the cost of a new larger well.

Deepening a deep rock well is very apt to produce water with an excessive salt content.

Rehabilitation of old wells will seldom produce economically high capacities of the low-value end product, namely, water.

Much valuable information on this subject is given in a pamphlet entitled, "*Rehabilitation of Sandstone Wells*," by J. B. Millis. It is issued by the Department of Registration and Education, State Water Survey Division, Urbana, Illinois.

Careful and regular water level readings, plus flow meter readings, are essential so that new wells can be drilled in plenty of time, or old wells rehabilitated in plenty of time.

Opinion is divided as to the results obtained with acid treatment of old wells. Good and bad results are reported.

Where new wells are to be drilled, they should be designed to meet capacity requirements and to provide efficient pumping installations.

New wells should preferably be located outside of present cones of influence where competition from existing industrial wells and municipal wells will be at a minimum.

It is wise to build reservoirs to handle hourly peak demands. Location of water consuming industries in areas where wells are failing should be discouraged.

Large straight wells with large casings down deep to accommodate low settings of turbine pumps are called for when new work is undertaken.

Deep rock wells should be supplemented where possible with gravel-packed gravel wells of good quality to handle peak days. Such wells may produce excessive amounts of iron which should be removed.

In localities where well supplies are deteriorating rapidly, plans should be made now for surface supplies with a multi-stage construction program and a multi-stage financial plan.

These programs should be designed to complete construction comfortably ahead of demand but not excessively ahead of demand. If this is not done, excessive rates are inevitable. Most careful engineering surveys and studies are needed to form the foundation for multi-stage construction plans and multi-stage financial plans.

In planning now for surface supplies consideration can be given to:

- A. Practically inexhaustible Lake Michigan.
- B. Impounding reservoirs, where found to be practicable, on the DuPage River, Fox River, Hickory Creek, Kankakee River, etc., etc.
- C. Research work is needed on high-velocity pipe lines in order that pipe lines, properly designed for normal day demand, may also be utilized for a few high demand days without excessive increases in annual power costs.
- D. Form combinations of large users, municipal and industrial. It would appear that such combinations should follow straight lines from Lake Michigan or Chicago city limits. Belt line pipe lines appear to be uneconomical because of the large mileage involved, with no paying customers adjacent thereto.

Summary

There seems to be no immediate danger of water famine in the Chicago Metropolitan Area providing adequate engineering studies are started at once and recommendations for rehabilitation of

old wells and construction of new wells are followed promptly, and advance planning for surface water supplies is started soon.

Financial planning should go along simultaneously with physical planning. Open-end bond issues should be used with minimum requirements for surpluses in the rate structures.

Careful records of the performance of all wells in the system should be constantly maintained and studied to note trouble before it starts. An analogy can be drawn between the need for an individual's necessary periodical medical examinations and the equally important periodical examinations of well water supplies, the only difference being that the examinations of well water supplies should come at more frequent intervals than is the case with a healthy man or woman.

Groups of municipalities and industries following straight lines from Lake Michigan or the corporate limits of Chicago should be set up to provide, in the foreseeable future, a supply of Lake Michigan water.

The public must be educated to the necessity of paying higher rates for the Lake Michigan supply. My feeling is that Lake Michigan supplies will be needed as far west as the Fox River towns in 40 to 50 years. All indications point to Lake Michigan as the only dependable water source two to five decades hence, from Chicago to points sixty miles away.

The economical solution in any one case may involve the purchase of water from the City of Chicago, or it may involve the creation of independent Lake Michigan intake filtration plants and pumping stations.

Rehabilitation of existing wells, and the drilling of new wells, could be carried out at reasonable cost pending the development of plans and actual construction of Lake Michigan water supply works.

It is not too early to begin planning now for Lake Michigan water. In many situations the additional cost of getting Lake Michigan water, compared to developing more well supplies, will be justified by the increased safety of supply. For an interlude period the well supplies could be maintained in conjunction with a Lake Michigan supply, using the well

(Continued on Page 20)

Chicago Area Water Supply

3. A Proposed System for the Area

Loran D. Gayton, Assistant City Engineer

The Chicago Metropolitan Area, as described in this paper, is the land area circumscribed by a circle with its center at the intersection of State and Madison Streets in Chicago, and with a radius of forty miles. This assumed Metropolitan Area reaches from Waukegan, Illinois on the north to Gary, Indiana on the south; as far west as the cities of Elgin and Aurora; and southwest to the City of Joliet. In this area there were, as of 1940, 168 incorporated cities, towns and villages, and 25 unincorporated villages, making a total of 193 communities.

Occupancy of the Area

The city of Chicago stretches for 20 miles along the Lake Michigan shore line, approximately north and south, and at certain locations it reaches back approximately 10 miles from the shore line. It covers an area of approximately 212 square miles. The main branch of the Chicago River enters Lake Michigan at a point almost exactly midway between the north and the south limits of the city's shore line.

The central business district of the city, or the so-called Loop area, reaches from Chicago Avenue on the north to 12th Street on the south, or a distance of approximately two miles, and from the Lake Shore on the east to the south branch of the Chicago River on the west, a distance of approximately one mile. This central business district is built up almost solidly with commercial and office buildings of the skyscraper type.

From Chicago Avenue northward to the city limits and from the Lake Michigan shore line westward to the city limits, there is a predominately residential area broken here and there by local community business centers. Directly west of the business center of the city is an area made up partly of manufacturing, partly of commercial and partly of residential structures.

Reaching from 12th Street southward along the shore line to 79th Street, a distance of approximately eight miles, and reaching westward from the shore line to the city limits, is an area that is generally residential, although this area is dotted with manufacturing establishments, industries such as the Union Stock Yards, and numerous community business centers.

From 79th Street southward to the city limits at 138th Street, a distance of approximately seven miles, and spreading east and west for a distance of approximately five miles, we find one of the world's greatest industrial areas. This is the great Calumet Industrial District with its huge steel mills, car works and docks. We also have an almost continuous industrial and manufacturing area stretching along both banks of the north branch of the Chicago River, and also on the Chicago Sanitary District Canal reaching across the city to the southwest. The majority of Chicago's industrial and manufacturing areas lie south of Chicago Avenue and reach to 138th Street, and from near the Lake Shore westward to the city limits. This whole area is covered with a network of railroads with numerous terminals and switching yards.

Northward from the Chicago city limits along the shore line to Waukegan are numerous residential communities with practically no industrial occupation, although the city of Waukegan does have some large industries. To the northwest, west, and southwest of Chicago, and lying within a circle 20 miles from the intersection of State and Madison Streets, in Chicago, are numerous small residential communities with little or no industrial occupancy. In these same areas and lying beyond the 20 mile circle, but within the 40 mile circle, we find mostly rich farming land with small community centers widely separated.

From the southern limits of the city of Chicago, and reaching along the Indiana shore line to Gary, we find a continuation of the Calumet Industrial District, with huge steel mills, cement plants and oil refineries. South of the Indiana Industrial area, are a few small residential communities, and beyond these, farming country.

In addition to the foregoing description of the various industrial districts of the area, attention should be called to the city of Joliet, lying to the southwest of Chicago, and approximately 35 miles from the intersection of State and Madison Streets in the city of Chicago. Joliet is an industrial city with a number of large and important plants and is strategically located on the Des-plaines River at what is sometimes called the head of the Illinois Waterway, and it is also an important railroad center.

Elgin and Aurora are two other fairly large cities lying to the west of Chicago, and approximately 35 miles from the Loop. Each of these cities is a center of a rich farming area and, no doubt, will continue to be purely residential and commercial.

Population

The 1940 U. S. Census gave the 168 incorporated communities in the assumed Chicago Metropolitan Area a population of 4,607,990 inhabitants. The Census gave no population for the 25 unincorporated villages. We have estimated the rural and unincorporated population as 191,260 and this added to the Census figures for the incorporated communities, gives a total population for the assumed Chicago Metropolitan Area of 4,799,250, as of the year 1940.

The city of Chicago with a population of 3,396,808 in 1940 represents 71% of the population of the entire Metropolitan Area and approximately 90% of the population of the Metropolitan Area was within the limits of a

(Continued on page 12)

3. A Proposed System For the Area

(Continued from Page 11)

circle 25 miles from the intersection of State and Madison Streets in Chicago.

From Waukegan on the north, to Gary, Indiana, on the south, and including these cities, there are 15 municipalities with a population of 3,816,234 as of 1940, taking water through their own intakes from Lake Michigan. The city of Chicago supplies Lake Michigan water either directly or indirectly to 45 towns having a population of 398,215 as of 1940. Therefore, there are 60 towns, or 35% of the municipalities within the 40-mile circle, getting Lake Michigan water.

The above 60 towns have a total population of 4,214,440 as of 1940. Assuming the total population of the 168 incorporated municipalities within the 40-mile circle as 4,607,990, we find that approximately 91% of the incorporated population within the 40-mile circle secures a water supply from Lake Michigan at the present time.

Sanitary District Act

The act creating The Sanitary District of Chicago was passed by the Illinois State Legislature on May 29, 1889. Under this act the city of Chicago was required to furnish water to any municipality in the District at a cost no greater than that charged like large consumers within the city limits.

The first municipality to take advantage of the act was Burnham, which made a connection to the Chicago system in 1909. At the present time there are 34 municipalities, beyond the city limits, but within the Sanitary District, taking water directly from the Chicago system, and 11 more getting water indirectly from the Chicago system, making a total of 45 communities getting Lake Michigan water from Chicago.

Ground Water Supplies

With the exception of the municipalities taking their water supply from Lake Michigan, all the municipalities in the Chicago Metropolitan Area secure their water supplies from wells of varying depths. In the Chicago area the majority of these wells extend either into

the St. Peter or Potsdam Sandstones and vary in depth from 500 to 2300 feet.

For many years, the demand for water from these wells has been increasing and the elevation of the water table has been dropping at an average rate of from five to eight feet per year. Due to this rapid lowering of the water level, the cost of pumping water from these wells has greatly increased. Also, many municipalities have been compelled to drill wells to such a great depth that the water is highly unsatisfactory as to its mineral content, and in the majority of cases it is extremely hard. So many new wells have been driven in recent years and the demand for these wells has been so great that, at the present time, the majority of the municipalities in the area find the water supply from these wells absolutely inadequate to serve their purposes now or in the future. The indications are that the conditions outlined above will continue to grow worse and that the time is not far distant when the municipalities, now served by deep wells, must look to Lake Michigan as a new source of supply.

From 1924 to 1948, nine different water supply systems, to supply the Chicago Metropolitan Area, were proposed by various groups. Seven of these systems were to build their own intakes and two proposed to take water from the Chicago system. Up to date no one of these proposed systems has been built.

Suggested System

In August, 1947, Oscar E. Hewitt, Commissioner of Public Works of the city of Chicago, made public a plan showing a possible extension of the Chicago water supply system, to supply Lake Michigan water to 62 municipalities in the Chicago Metropolitan Area, now depending upon ground water supplies. This plan was the result of studies made by the Bureau of Engineering over a period of years.

The municipalities to be served reach from Barrington on the north line of Cook County on the north, to Elgin, St. Charles and Aurora on the west, to Joliet on the south west, and to the south line of Cook County on the south. This system will serve Lake Michigan water to every municipality of any size in the area under consideration, not now supplied with water from Lake Michigan.

The 1940 Census gave these 61 municipalities a population of 320,548, and it is estimated their 1970 population will be 493,000.

Based on a per capita consumption of 150 gallons per day, it is estimated that the maximum day demand in 1970 will be approximately 74,000,000 gallons.

The system is designed to meet the maximum day's demand in 1970, and to deliver water at ground level at the boundary of each municipality. Each municipality is to provide and maintain any necessary reservoirs and pumping equipment and distribute the water to the ultimate consumer. The water is to be metered at the point of delivery to each municipality.

The system has been divided into three major zones, the Northwest, the West or Central, and the South. The required quantity of water for both the Northwest and Central zones will be available from the Chicago Avenue tunnel. A ten-foot-diameter extension of the Chicago Avenue tunnel to 25th Avenue, in Melrose Park, is proposed. Provisions for a reservoir and low lift pumps at the end of the tunnel have been made so that if the peak demand by city consumers should require all the water in the tunnel for several hours the suburban system could continue to pump from the reservoir, which would be refilled during the off-peak demand.

Northwest Zone

The Northwest Zone, taking water from the Chicago Avenue Tunnel, will serve 19 communities, with an estimated population in 1970 of 111,600; and an estimated maximum day's water demand of 16,740,000 gallons. The Northwest Zone will require three booster pumping stations.

Central Zone

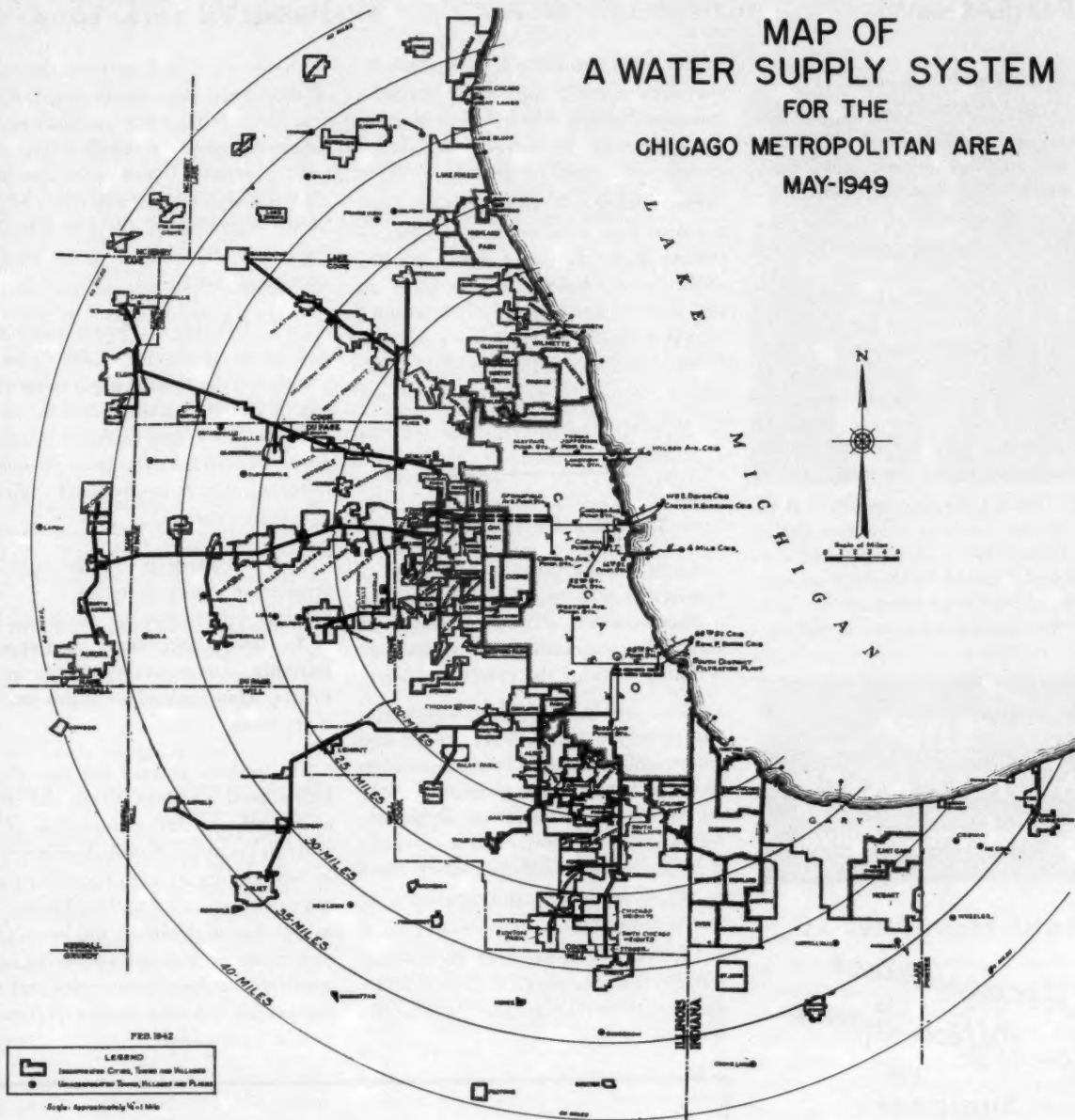
The Central Zone taking water from the Chicago Avenue tunnel, will serve 18 communities, with an estimated population in 1970 of 224,600, and an estimated maximum day's water demand of 33,690,000 gallons. The Central Zone will require two booster pumping stations.

South Zone

The South Zone, taking water from the Roseland Pumping Station, will

(Continued on Page 14)

MAP OF A WATER SUPPLY SYSTEM FOR THE CHICAGO METROPOLITAN AREA MAY-1949



3. A Proposed System For the Area

(Continued from page 12)

serve twenty-five (25) communities, with an estimated population in 1970 of 156,800, and an estimated maximum day's demand of 23,415,000 gallons.

The South Zone is divided into two projects, both getting water from the Roseland Pumping Station. To increase the capacity of the Roseland Pumping Station, a new twelve-foot tunnel is to be built in 74th Street, from Oglesby Avenue to State Street. This will take its water supply from the existing tunnel at Oglesby Avenue and connect with the ten-foot tunnel running south in State Street to the Roseland Pumping Station.

The Chicago Heights project will require a reservoir and a booster station near 151st Street and Indiana Avenue. If the peak demand by the City consumers should require all the water available from the main, the booster could con-

tinue to pump from the reservoir, which would be refilled during the off-peak demand.

The Joliet project will be exclusively supplied by new pumps at the Roseland Pumping Station, which will deliver the water at sufficient pressure so that no booster station will be needed.

Preliminary cost estimates, made from the drawings, indicate that the Metropolitan Water Supply System outlined, could deliver Lake Michigan water to the municipalities under consideration at reasonable rates. However, new legislation would be required to enable Chicago to extend its water supply system beyond the city limits.

To Offer Utility Course

A new evening course in public utility regulations will be offered during the coming semester by Illinois Institute of Technology, according to Stanton E. Winston, dean of the evening division.

The course is designed for managerial and technical personnel of private and public utilities and includes instruction in federal and state jurisdiction, the courts and commissions, rate regulation, regulation of accounts, control of security issues, service regulation, the Federal Power Commission, and problems of public ownership.

The course will be given on Monday and Thursday evenings, 8:15 to 9:25 by the department of political and social sciences.

Urge Help for Engineers During First Five Years

The problem of launching the career of the young engineer during the five-year period following graduation, and how the nation's 150,000 older, registered professional engineers can assist him, was discussed at the Hotel Statler, by the American Institute of Electrical Engineers' Winter General Meeting, which has just closed.

H. L. Solberg, of Purdue University, and James H. Foote, of the Commonwealth and Southern Corporation, Jackson, Mich., in a paper entitled "Registration of the Young Engineer," outlined proposed help for them from graduation to registration as professional engineers five years later.

They suggested that older engineers arrange meetings designed to provide accurate information on the provisions of the law in their states, and sponsor refresher groups to prepare them for written examinations in states that require them.

The authors pointed out that the informational meetings should be developed with the full cooperation of the State Registration Boards because of the lack of uniformity with regard to standards and procedures in the 48 states, and said that such efforts should be cooperative on the part of all engineering societies within a local community and that competition between engineering groups should be avoided.

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Hold Washington Award Dinner February 27

The Washington Award for 1950 will be presented to Wilfred Sykes, Chairman of the Executive Committee of Inland Steel Company, at the annual Washington Award Dinner, February 27, in the Furniture Club of America, 666 N. Lake Shore Drive.

Sponsors of this top engineering award are the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, and the Western Society of Engineers.

This year's recipient was born in North New Zealand in 1883, was educated in Australia at the Melbourne Technical College and the University of Melbourne, from which he was graduated in 1902 in electrical engineering. He also received the honorary degree of Doctor of Engineering from Illinois Institute of Technology in 1943.

Starts Career in Australia

He started his business career in 1901 in Australia as an engineer with Allgemeine Elektrizitäts Gesellschaft, later transferring with the firm to Berlin. In 1909 he joined the Westinghouse Electric and Manufacturing Company as an engineer, moving to the Steel and Tube Company of America as Executive Engineer in 1920, and served as consulting engineer with the Colorado Fuel & Iron Company during 1922-23.

Mr. Sykes joined Inland Steel Company as an engineer in 1923, becoming Assistant General Superintendent in 1927, and Assistant to the President in 1930. He was President of the company from 1941 to 1949, and is now Chairman of the Executive Committee.

His career in engineering has been outstanding from the start. While in Berlin as a young engineer with Allgemeine Elektrizitäts Gesellschaft he designed a number of large electrical hoists in connection with the electrification of the gold mines in South Africa. They were the largest installations built up to that time.

During World War I, while with the Westinghouse Electric and Manufacturing Company, Mr. Sykes had charge of designing electrical equipment for use of the Navy, including propelling equipment for battleships and submarines.

He was a pioneer in the development of electrical equipment for steel mills. He came to the Inland Steel Company to take charge of the electrification of Inland's mills and the development of power stations. At the time he joined the company its ingot capacity was 1,205,000 tons per year; under his direction this has been increased to 3,400,000 tons.

Mr. Sykes is the inventor of many improvements in the steel-making process. He is considered an authority on electric hoists for coal mines and other applications, and on steel mill electric drives for rolling mills. He is the author and editor of a number of references on these subjects.

During World War II he was a member of various government advisory committees in connection with the operation of the steel mills and the production of steel products for war.

Role in Community Service

In addition to his outstanding service in the field of engineering, research and administration, he has contributed a great deal of time and interest to two local educational institutions, Illinois Institute of Technology and the Glenwood Manual Training School. He has been very active in planning the new building program of I.I.T. which, when completed, will make that school one of the finest technological plants in the country, serving particularly the industry in the Middle West.

The Glenwood Manual Training School, located at Glenwood, Illinois, provides a home and proper training for underprivileged boys. The school consists of a farm of some 500 acres and 25 buildings, and is supported by endowments and contributions of public-spirited citizens. Mr. Sykes has been very much interested in all phases of the work of this school.



Wilfred Sykes

He has promoted the welfare of the people of Chicago through his service with the Chicago Association of Commerce and Industry as a director, president from 1947 to 1949, and present Senior Counselor. As a member of the Illinois Post-War Planning Commission, he participated through the war years in recommendations to the governor and legislature for the advancement of the state.

He is a member of the American Iron and Steel Institute, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Society of Engineers, and numerous other technical organizations. He is a fellow of the Royal Society of Arts. He is a director of The Pullman Company, and the National Association of Manufacturers, and a trustee of Illinois Institute of Technology. He is a member of the Chicago and Union League clubs.

David C. Peterson has been appointed director of engineering and manufacturing of Division One of the Stewart-Warner Corp. Director of engineering since 1946, Peterson is assuming as director of both engineering and manufacturing, duties relinquished by George Thomas, who has been designated production consultant to the vice president.

Why Join the Western

THESE MEN HAVE SECURED THEIR NEW MEMBER

Allen, A. G.
Anderson, Bolton G.
Anderson, R. E.
Andrews, F. E.*
Artman, Mrs. M. E.

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Baier, P. J. Jr.*
Balkin, S. F.
Beattie, C. S.
Becker, Donald N.
Benoit, Wm.
Bernhard, Leroy F.
Blanchard, G. L.*
Bonham, J. D.*
Bradley, B.
Brewer, A. H.
Burt, George H.
Buxton, B. L.

Carlson, A. C.
Carlson, W. W.
Caskey, A. D.*
Coxe, H. A.*
Culp, E. R.

Dartsch, F. A. L.
Davies, F. C.
DeLeuw, C. E.
DeWolfe, E. C.
Dinsdale, David A.*
Doyle, T. M.

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Egloff, Gustav
Elder, Clarence H.
Elliott, E. E.
Epstein, A.
Eshbach, O. W.*
Euler, F. C.*

Fischer, David J.
Fletcher, E. N.*
Flood, Paul
Fox, E. Gordon*
Frederick, T. C.

Gabbard, L. C.
Garrison, C. K.
Gibson, F. D.*

Gleick, J. T.*
Goodell, F. K.
Gordon, B. A.
Gordon, J. J.*
Gould, G. Frederick*
Graham, I. E.
Gray, Walter
Griesel, Margaret
Guthrie, R. M.
Guttsell, L. M.*

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Halvorsen, H. L.*
Halvorsen, Ralph
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Hanson, R. M.
Haynes, C. J.*
Hecht, J. L.
Hendrickson, E. R.*
Herr, C. C.
Holt, N. C.
Horneman, Miss B.
Howson, A. W.
Huff, Julius
Humiston, J. F.

Imhoff, E. A.

Jackson, A. L.
Jelinek, O. K.
Johnson, Elmer A.

Kahler, W. V.
Kawiecki, C. J.
Keith, A. W.
Kelly, R. R.
Kerr, A.
Kintner, R. C.
Klammer, K. K.
Kraft, John E.
Kreller, R. A.*
Kocsis, P. Jr.*
Kucho, Joseph

Lagerstrom, Harry*
Langdon, L. E.
Larson, M. N.
Lauritsen, C. N.*
LeBaron, T.*
LeClair, Titus G.
Lockwood, L. E.

Lundberg, H. H.*
Lusher, M. H.*

McCallum, V. E.*
McClurg, V. O.
McKee, K. E.
McLean, C. J.
Maney, F.
Marsh, Edward J.
Marston, W. R.
Mee, C. L.
Melnick, T.
Michaels, E. E.
Miller, Herbert R.
Mitchell, Chester F.
Mittelmann, Eugene*
Murphy, Miss M. L.

Nielsen, E. R.

O'Connor, R. R.*
Ooms, J. W.*
Orloff, Melvin

Penn, J. C.*
Perkins, Miss R.
Peterson, Jas. Edw.*
Peterson, Ralph S.
Pillsbury, C. S.

Randall, Edwin A.
Reske, E. F.*
Retaliata, J.
Ritchie, James F.*
Rivenes, A.
Rogers, D. E.
Ruzich, J. L.

St. Germain, A.
Salzman, A. L.
Sargent, Ralph
Saunders, N. H.
Sawyer, Percy
Scaar, Harry
Schick, N.
Schirmer, R. W.
Schlesinger, L.
Schmitz, C. E.
Schoonover, Howard
Scopelite, J.
Schutte, L. H.*
Sedwick, H. P.

Western Society of Engineers?

The present membership drive winds up at the end of May. So far, 300 new applications have resulted from the excellent work of the membership committee. These will bring our present membership of 2700 up to 3000. However, we have not yet reached our goal. The membership drive underway calls for EVERY MEMBER TO GET A MEMBER. Have YOU secured yours?

You will do your friends a service by bringing them into the Western Society. Consider a few of the advantages which the Society has to offer:

1. Western Society is the only organization which offers complete club room facilities in the Chicago loop for as little as \$20.00 per year. In addition, this sum offers to the engineer the following benefits:
2. Western Society is recognized as *the* society representing the engineering profession in the Chicago area. Its members are selected to serve on such important groups as the City Planning Commission and the Sag-Calumet Navigation Project.
3. Western Society represents a cross-section of the engineering profession. Its members have the opportunity to meet and know men from every branch of engineering.
4. Western Society membership offers personal contacts with outstanding leaders in engineering and business.
5. Western Society members have the opportunity to continue or brush-up on their education through the evening course work made available. The courses offered now include not only engineering work but broader studies in economics, public-speaking and philosophy with special emphasis on the relation of these subjects to engineering and the engineer.
6. Western Society, in the weekly meetings of its ten sections, offers the engineer an opportunity to keep abreast of technical developments.

**Gustav Egloff,
President**

THESE MEN HAVE SECURED THEIR NEW MEMBER

Seymour, C. W.
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Sommerschild, H. F.
Spencer, A. L.
Stanton, K. J.*
Strazz, A. J.
Stump, R. D.
Sykes, Wilfred

Taylor, O. H.
Thomas, Frank P.*
Tornquist, E. L.
Tuttle, L. W.

Vanderkolk, W. W.
Vivoda, J. V.*

Wade, J. William
Walker, C. W.
Weeks, L. E.
Whitehead, E.
Whiting, F.
Wier, R. J.

Wilkins, D. C.
Willet, G. R.
Williams, C. M.
Williams, Kenneth
Wilson, J. R.
Wisner, G. F. Jr.
Wolfe, Thomas
Woloshin, Boris

Zermuehlen, H.

* Since last period.



John P. Tansey



William R. Marston

Tansey and Marston Appointed by Officials To Important Posts with City of Chicago

Two WSE members, John P. Tansey, Jr., and William R. Marston, have been appointed to new posts with city departments.

Mr. Tansey was recently appointed by Mayor Kennelly as assistant to Oscar Hewitt, public works commissioner.

Tansey had wide experience in the construction and engineering field before he received his degree in civil engi-

neering from Illinois Institute of Technology last June. He was with the Illinois Division of Highways from 1934 to 1939 and in the latter year joined the Herlihy Mid-Continent Co., where he was an engineer on the Chicago subway, assistant general superintendent on construction of the Calumet generating station and building engineer for the main office of the Commonwealth Edison Company.

He has also been associated with the Contracting and Material Company of Evanston as field engineer and estimator and with the John Marsch Construction Company. From 1940 to 1942 he was area superintendent of five munitions plants for the DuPont Company.

During the war Tansey was in charge of maintenance and construction of an air field and other installations at Tarawa and heavy equipment and repair shops on Saipan for the Navy.

Most recently, he has been associated with Mundie, Jensen & McClurg, architects and engineers, and with the E. L. Archibald Company, general contractor, as an estimator.

He is also a member of the American Ordnance Association, American Society of Civil Engineers, and Chi Epsilon (honorary civil engineering fraternity).

William R. Marston has been named deputy city traffic engineer by Lloyd M. Johnson, commissioner of streets and electricity.

He received a B.S. degree in railway electrical engineering from the University of Illinois in 1931, and upon graduation became associated with the Chicago Surface Lines as a student engineer.

After the training period, Marston worked under the staff engineer on all phases of mass transportation, including car and bus design, street traffic studies, parking studies, cost analysis, etc.

In April, 1942, he left on leave to enter the government service, as a business analyst with the Office of Price Administration, working on special research for the development of tire rationing methods. He was later placed in charge of a newly-formed Transportation Unit of the Gasoline Rationing Branch.

After Navy duty as a lieutenant in command of an LCI (L), he returned to the Chicago Surface Lines in February, 1946, becoming traffic engineer with the organization, which was to become a part of the Chicago Transit Authority in October, 1947.

As traffic engineer with the CTA, he has coordinated CTA operations with street traffic, devised methods of reducing street traffic interferences, and carried on transit surveys and research.

He was secretary of the WSE Civic committee from 1947 to 1949, was program chairman of the Traffic Engineering and City Planning section, 1948-49, and attendance chairman, 1949-50, for both the section and for WSE as a whole.

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CRERAR LIBRARY Notes and News

On February 1, The John Crerar Library will begin publication of a bi-weekly notice of new books and periodicals acquired for the Technology Department. This new bulletin will bear the title **THESE ARE NEW**. Copies may be picked up in the Technology Department on the 14th floor.

The primary emphasis in the acquisitions policy of the Library is on the purchase of current books and periodicals. In the course of the Library's fifty-five year history, however, we have gradually accumulated a very respectable collection on the history of engineering. And occasionally, outstanding older books are added. Among such, during the past year, was the first edition of one of the greatest early American mechanical works: *The Young Mill-Wright & Miller's Guide*, by Oliver Evans, published in Philadelphia in 1795.

The author was an outstanding, early American inventor credited with developing the first steam engine constructed on the high-pressure principle. He also constructed the first steam dredging machine used in America. His inventions of milling machinery included the elevator, the conveyor, the drill, the hopper-boy, and the descender, the application of which effected a revolution in the manufacture of flour. This work, and some of its contemporaries will be on exhibit in the Technology Department during the last two weeks in February.

* * *

The new arrangement of periodicals in the Technology Department is being provided with a visible index of titles, in which references may be found to case number for each periodical. The index should greatly facilitate the location of particular titles, and will have the further advantage of leading the researcher to a group of periodicals in the subject field of his interest. Suggestions are always welcome on important new titles which should be made available in Crerar.

MIDWEST ENGINEER



James W. Jardine (left) with Mayor Martin H. Kennelly

Jardine Appointed Vehicle Commissioner By Mayor Kennelly, to Succeed Gorman

James W. Jardine (WSE), former city paymaster, has been confirmed by the city council as Mayor Kennelly's new vehicle commissioner.

He will have the task of straightening up the vehicle office, following the resignation of Edward J. Gorman after irregularities were discovered.

In speaking of his appointment, Mayor Kennelly stated, "Jardine will do whatever is needed to put the office on an efficient basis. He is being put in to do a job."

Jardine was an engineer for the state highway department from 1933 to 1938. He worked on the last northern link of the Outer Drive. In 1938 he became a city traffic engineer.

He had taken the patrolmen's examination in 1936. The results were an-

nounced in 1938 and he topped the 30,000 candidates. He has been paymaster since 1942, and will be on leave from that civil service position.

The commissioner has 300 employees, and has jurisdiction over licensing and regulation of taxicabs and safety testing of cars.

Personal

Dr. Eugene Mittelmann (WSE), consulting engineer, was appointed chairman of the subcommittee on measurements of the I.R.E. Industrial Electronics Committee. This is his third year of service on this committee, and he is also acting as a liaison member for the I.R.E. on the High Frequency Heating Committee of the A.I.E.E.

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2. The Critical Situation In the Outlying Sections

(Continued from Page 10)

supplies to handle peak hours and perhaps even peak days. Such an interim system will reduce the cost of the initial Lake Michigan water supply installation.

New York City today is paying the penalty for tardy planning and tardy construction. The towns in the Chicago Metropolitan Area, which are utilizing well supplies today, will be well advised to start their planning now and their construction in the very near future.

The problem in the Chicago area will be intensified rapidly because use of shallow wells contiguous to septic tanks must in the near future be discouraged and prohibited by law in urban and semi-urban areas. County and township health officers must see to it that such situations are controlled. At Joliet 45,000 persons in such outlying areas are rapidly being supplied with city water mains and city sewers.

Naturally such badly needed improvements will add to Joliet's water needs. Most every suburban or satellite town in the Chicago area faces similar problems.

As an example of the action that can be taken, Joliet has been engaged, since February, 1947, in a notable multi-stage program for improving its water supply and sewerage facilities. What Joliet is doing other communities, or groups of communities in Northeastern Illinois can do.

The planning has included not only improvements for the needs of the incorporated City but also for the contiguous areas with a population of 45,000.

It has been determined that eventually Lake Michigan will be Joliet's major source of water supply.

In the meantime three new deep rock wells and five new gravel-packed wells in gravel formations have been drilled in the Hadley Valley easterly from the City limits. Water from these wells will be conducted through a 30-inch reinforced concrete pipe line 17,500 feet long, leading to an Iron Removal Plant, Reservoir and High Lift Pumping Station in the city. The pipe line is a step in the right direction with its easterly terminus 34 miles from Lake Michigan.

Comparison of Sources

In comparing the sources of water supply there is included only the cost of supplying the water to the low pressure distribution system at Elevation 660. The well supply will be cooler than Lake Michigan supply or Chicago supply. The Lake Michigan supply or Chicago supply are much softer than the well supply, and do not contain an objectionable amount of iron. The well supply should have the iron removed from the gravel well water, and also be softened when the well supply has been proven.

The projects compared are as follows:

Project No. 1—Well Supply with Iron Removal.

Project No. 2—Well Supply Softened.

Project No. 3—Lake Michigan Supply.

Project No. 4—Chicago Water Supply.

The comparative costs include the construction cost of the source of supply and getting water to the low pressure distribution system in Joliet; and the

annual cost of same. It must be kept in mind that in order to get the total cost of water, the additional cost of reservoirs in Joliet, the distribution system costs, and the present operating costs must be added.

Construction Project Costs (Supply Only)

Project No., Description	Project Cost	
	12 M.G.D. Capacity	14 M.G.D. Capacity
1 Wells (Iron Removal)	\$1,415,000	\$1,648,000
2 Wells (Softening)	2,810,000	3,210,000
3 Lake Michigan Supply	5,270,000	5,900,000
4 Chicago Water Supply	3,400,000	3,800,000

Joliet Water Supply

The Joliet planning includes Master Plans for Water Main and Sanitary Sewer Extensions throughout the Joliet Area, both outside of and inside the city limits. \$2,000,000 of such extensions were constructed in 1948 and 1949. Connecting property owners, in lieu of paying special assessments, pay \$250.00 each in ten monthly installments. Customers outside corporate limits pay rates 50% in excess of City charges.

Other elements in the multi-stage planning include:

For 1950

Intercepting Sewers and Sewage Treatment Plant.

\$900,000 for Water Main and Sewer Extensions.

For 1951

Three Deep Rock Wells.

Ten Gravel Wells and 18,000 feet extensions of the 30" pipe line heading toward Lake Michigan.

Water Feeder Mains.

West Side Reservoir.

\$900,000 of Water Main and Sewer Extensions.

Beyond 1951

Lake Michigan Supply including Intake, Filtration Plant, Pumping Stations and Completion of 30" Pipe Line.

Secondary stage of Sewage Treatment Plant.

Extensions of Water Mains and Extensions of Sanitary Sewers.

It is planned to accomplish all this in twenty to thirty years with a 95% average increase in old water rates.

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Nominations for WSE Service Awards Open

By action of the Board of Direction, Service Awards may be given to members for outstanding service to the Society in the fields of membership, development work, committee work or for papers published in the *Midwest Engineer* but not presented at a meeting. The award is limited to ten recipients annually.

The Awards Committee, which will make recommendations to the Board of Direction, invites nominations of candidates for the awards by members of the Society. Nominations will be accepted by the Secretary until April 1. The awards will be presented at the annual meeting May 29.

Nominations should include a brief description of the work for which the member is being recommended. The service may not necessarily have been performed within the last year.

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Time To Start...

Writing a Paper to Enter In WSE's New Contest

The Western Society of Engineers has announced a new competition open to all of its members.

Cash awards will be given for the best papers on subjects related to any phase of engineering. Three awards, totaling \$500, will be given. First prize will be \$250, second \$150, and third \$100. Funds for the prizes were donated by members of the Board of Direction and other interested members.

Papers will be judged on originality, editorial merit and value to engineering. They will not be presented orally, and may be of any length. The winning papers will be published in the *Midwest Engineer*.

Notice of intent to enter the competition should be sent by March 1, 1950 to the Executive Secretary of the Western Society of Engineers, J. Earl Harrington. Papers must be submitted to the Awards Committee of Western Society of Engineers not later than May 1.

The prizes will be presented at the Annual Spring Dinner to be held May 29, 1950.

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Third Professional Engineering Course To Begin Feb. 21

The third Professional Engineer refresher course is set to begin February 21 and continue through April 27, 1950, preceding the examination in May.

The sponsors are WSE and the four founder societies, AIEE, ASME, ASCE, and AIME.

It will be taught by instructors from the University of Illinois' Navy Pier Branch, Illinois Institute of Technology, and Northwestern Technological Institute. Twenty meetings of two hours each will be held. Test questions used in earlier Professional Engineer examinations will be used as a guide for the course. Tuition will be \$16.50, payable at the time of registration.

Interested engineers should contact the Extension Division, Illini Center, LaSalle Hotel, Randolph 6-7750, the Western Society of Engineers, 84 E. Randolph St., Randolph 6-1736, or any of the other sponsors.

Structural Engineers Refresher Course Enrolls 75; May Be Repeated In Summer

Seventy-five Chicago-area engineers have enrolled for the first refresher course for structural engineers at the University of Illinois' Chicago Undergraduate Division. The classes, designed for engineers preparing for the state licensing examinations on March 23 and 24, started Tuesday evening, Jan. 10, at the U. of I. Navy Pier campus.

The U. of I., Illinois Institute of Technology, and Northwestern Technological Institute are cooperating with the Western Society of Engineers & the Illinois Section of the American Society of Civil Engineers to offer the course. Faculty members from the universities are serving as instructors.

The classes will meet for two-hour sessions on Tuesday and Thursday evenings for eight weeks. Two weeks will be devoted to each of four topics. The first topic, the mathematical and scientific background of the engineering profession, is taught by Theodore A. Mucha, instructor in general engineering drawing at Navy Pier.

The second topic, the principles of design for reinforced concrete, and the third topic, structural steel design and the fabrication of structural steel, will be taught by James G. Smidl, professor of mechanical engineering at I.I.T. The final topic, the use of timber and masonry, will be conducted by Frank E. Woloszewick of Sargent and Lundy, Chicago.

This is the first refresher course for structural engineers to be given in the state, and plans are being made to repeat the course prior to the structural engineers examination in September.

In charge of arrangements for the course are J. T. Rettaliata (WSE), dean of engineering at I.I.T., O. W. Eshbach (WSE), dean of admissions at Northwestern Technological Institute, and Frederick W. Trezise, dean of engineering at the U. of I. division. The course is being offered through the U. of I. extension division.

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Offer General Education Courses

The General Educational Committee of the Four Founder Societies and the Western Society of Engineers now offers to any and all engineers its first three general courses as outlined below. These are to be given by the University of Illinois, at Navy Pier, on the basis of sixteen weekly two-hour evening sessions. The total fee for instruction for any one course has been set at \$11.50, payable upon registration.

Those interested in any of these courses should immediately advise either of the following:

Mr. T. H. Dekker, U. of I., Randolph 6-7750
Miss Bonnie Weir, W.S.E., Randolph 6-1736

Each of these courses has been prepared specifically for the purposes of adult engineers and is not a regularly offered undergraduate course:

Course	Instructor	Date	Time
Philosophy	Dr. Daniel J. Morris	Starting February 9	6 p.m.
Economics	Dr. W. D. Grampp	Starting February 13	6 p.m.
Public Speaking	(To Be Announced)	Starting February 15	6 p.m.

Philosophy

This course deals first with normally unsuspected problems that lie beneath the surface of familiar things not only in science but in general knowledge and even language itself. It then proceeds to discuss the philosophic bases of human interests and achievements and the correlation of all knowable things within a universal framework. This course is fundamental for a man's education because it will develop the art of thinking.

The panel plan of guided discussion within the group will be applied as rapidly as possible and the primary aim is to develop the realization that (1) while as soon as any field of inquiry yields knowledge susceptible of exact formulation it is called science, every science must be exposed to the light of philosophy for true understanding; (2) while science gives us knowledge, only philosophy can give us wisdom; and (3) that while philosophy includes many "isms" it is also the progenitor of such practicalities as higher mathematics and our actual way of life.

This is not a "dry as dust" subject but rather is one that will help us to see

Sauerman Brothers, Inc., has opened a new plant in Bellwood, Illinois, for manufacturing, assembling, and warehousing. Built specifically to meet Sauerman requirements, it is located beside the Indiana Harbor Belt railroad.

things as they really are and not as they seem to be.

Economics

This course first presents a systematic exposition of the central elements of the price system within our American economy and then analyzes the determinants of our available income and employment and the long term fluctuations within these total amounts.

These elements of economics are then used through class reports on readings and discussions, with the instructor serving primarily to guide the course, to secure a basic understanding of the different aims of free enterprise, democratic socialism, communism, fascism and other problems now confronting society

in choosing alternative kinds of economic organization.

In view of the current discussion in Government circles of farm subsidy programs, increased social security, pensions, etc., it is axiomatic that this course is essential to practicing engineers in the present economy.

Public Speaking

For those engineers who desire to be fluent public speakers, this course offers an excellent opportunity to achieve their ambition. The course covers principles of effective public speaking including organization of subject matter, presentation, and actual practice in delivery. An excellent course, intended to assist the engineer who is called upon to address public gatherings or serve as an expert witness.

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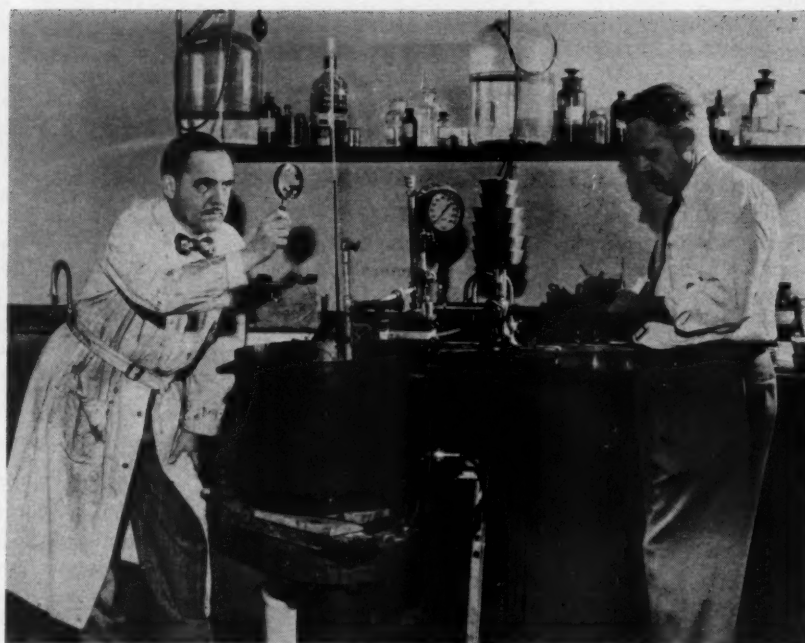
CH esapeake 3-5767

Develop 'Test Bomb' To Study Pipe Line Pressure Surges

The saving of tons of steel in the construction of new pipe lines throughout the world was made possible by findings on the "water hammer" phenomena released today by Northwestern University's Technological Institute. The new data will reduce breakdowns, leaks, and damage to oil and gas pipe lines formerly caused by pressure-wave surges.

Professors Lewis H. Kessler and Merrill B. Gamet of Northwestern's Civil Engineering Department have designed a "test bomb" for computing the bulk modulus of elasticity of various kinds of crude oils and gasolines from high pressures to low pressures and at temperatures from freezing to boiling. These figures, never before computed for the range of pressures and temperatures found in long pipe lines, will be available to all operators in the United States and to engineering organizations.

The Northwestern engineers explained that pressure-wave surges occur in all pipe lines when valves are closed too rapidly, and that surges may destroy valves, spring leaks in pipe joints, or even result in explosions from weak joints. They compared closing a valve to dropping a steel door in front of a speeding automobile, for the oil or gasoline moving along inside a pipe has a tremendous amount of moving energy. The pressure wave is set up when the



Prof. Lewis H. Kessler, left, and Associate Prof. Merrill B. Gamet of the Civil Engineering Department of Northwestern University's Technological Institute take readings from the bulk modulus "test bomb" they have developed. By varying the pressure with the weights at the right and changing the temperature with ice or heated water in the tank, the engineers have been able to measure the bulk modulus of elasticity of various kinds of crude oils and gasolines at a wide range of pressures and temperatures.

valve is closed, and the wave speeds along the fluid in the pipe until it is reflected from the source at the other end. If the pressure wave returns to the closed valve before the moving energy is dissipated, explosive pressures develop.

What the Northwestern engineers have done is design equipment, which they call a "test bomb," to determine the bulk modulus of elasticity, a figure necessary to find the speed of the pressure

wave in oil and gasoline. They vary the pressure with a series of lead weights, and the temperature is changed by the heated water or ice placed about the test bomb. Their equipment is relatively simple, and the professors hope to make the "test bomb" available for oil companies.

A series of tests on operating pipe lines accurately verified the conclusions based on the Northwestern data. Engineers now have a dependable basis for the installation of pipe lines and the operation of their valves, for water hammer surges can be computed and anticipated so that valves may be regulated to offset damaging effects. With the figures they have compiled it is now possible to design the correct thickness of metal in large pipe lines without wasting steel, a saving that becomes enormous for a line several hundreds of miles long.

The tests made by the Northwestern scientists were part of a research program of the Joint Surge Conference, sponsored by Middle East Pipelines, Ltd., Trans-Arabian Pipe Line Co., and the Gulf-Shell Pipe Line.

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WSE Nominating Committee Named

To the Corporate Members:

I am pleased to announce that in accordance with Article X, Section 3, of the Constitution, the Board of Direction has appointed a Nominating Committee as follows:

Verne O. McClurg, 39 S. LaSalle St.
F. G. Gordon, 220 S. State St.
F. A. Hess, Gibson (Hammond), Ind.
Titus G. LeClair, 75 W. Adams St.
John deN. Macomb, 105 E. Delaware Pl.
H. H. Morgan, 175 W. Jackson Blvd.
J. T. Rettaliata, 3300 S. Federal St.

The Constitution also provides that suggestions for nominees shall be solicited in the publications of the Society.

J. EARL HARRINGTON
Executive Secretary

Tear Off and Return

To the Nominating Committee, W.S.E.

I suggest the following names for consideration by your committee for offices indicated.

Officers and Trustees

President
1st Vice Pres.....
2nd Vice Pres.....
Treasurer
Trustees (two to be
nominated)

Members of Washington Award Commission

Past Pres. of W.S.E.....
Members not a Past Pres.
or at present a member
of the Board or candi-
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Communications Section Will Hold Election

The Nominating Committee of the Communications Engineering Section has nominated the following two Corporate Members as the regular ticket for Directors of the Section, for a term of three years beginning June 1, 1950:

Robert Daggett Wahlstrom, Division
Commercial Manager in charge of
operations and personnel for Lake
Division of Western Union Tele-
graph Company.

Clarence H. Elder, Area Plant Engi-
neer, Chicago Area, Illinois Bell
Telephone Company.

Other Corporate Members may be nominated by petition signed by ten Corporate Members of the Society, provided acceptance of these nominees has been secured in writing.

The Directors will be elected at a meeting of the Section to be held February 20, 1949.

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Urge Appropriation for Cal-Sag

An immediate federal appropriation of \$5,000,000 to continue development of the Calumet-Sag navigation project is being sought by the Chicago Association of Commerce and Industry.

Wilfred Sykes, chairman of a special committee of the association, emphasizes that if no funds are made available at this time, expensive revision and reconstruction will be unavoidable.

Sykes, who is chairman of the executive committee of Inland Steel Co. and a former association president, presented the request in Washington January 20 to a subcommittee of the House appropriations committee.

Approved in 1946

Approved by Congress in 1946, the project is a plan to improve the channels which link the Great Lakes with the Mississippi waterway system so tow boats and barges now employed on the Mississippi system could reach Lake Michigan.

Sykes told the subcommittee that the most economical procedure can be adopted if \$3,000,000 of the requested appropriation is used to construct the relocated Michigan Central Railroad bridge over the completed section of the widened channel.

If this amount is made available, it will save \$150,000 in temporary track connections, he said.

The extra \$2,000,000 is needed for more dredging of the additional unit of the channel east from Sag Junction to the Little Calumet River, where it is narrowest.

The Army engineers have proposed that the work consist of two parts. The first involves development of the Calumet-Sag channel, which runs from Sag Junction on the Chicago Sanitary and Ship Canal to the junction of the Sag Channel with the Little Calumet River, a distance of about 16 miles.

Part Two is concerned with development of the Grand Calumet River from the Little Calumet River east to East Chicago and Gary.

Estimates indicate that traffic on the Calumet Sag waterway within five years after completion, will increase from about 2,000,000 tons to more than 9,000,000.

The project is believed by the association to be of great importance to Chicago's transportation and industrial development.

The channels involved traverse a part of the Chicago industrial area devoted to the manufacture, use and storage of heavy products usually shipped in bulk.

The Calumet Sag Committee of WSE is also studying the problem and will present its recommendations later this month.

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WSE Women's Council News

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EXTRA!! DOUBLE HEADER!!

When Chairman Mary Murphy of The Professional Women's Council of W.S.E. calls the meeting to order February 8, 1950, everyone will be at strict attention. There will be two speakers—Miss Mary Ann Crawford who will discuss the Illinois Architectural Act (first passed in 1897), and Mrs. Margaret E. Artman who will discuss the Illinois Professional Engineering Act.

Miss Crawford, a licensed architect and engineer, graduated from the M.I.T. school of architecture and also received her Masters from the same school. She is practicing independently and is also a consultant to the Lindberg Engineering Co.

Mrs. Artman, a licensed engineer, is a graduate of the University of Chicago and an engineer with the Illinois Bell Telephone Co.

Any member of the Western Society is welcome at this meeting and is sure to gain valuable information from the scheduled discussions. The meeting will begin at 7 p.m. and a pre-meeting get-together dinner will start at 5:30 p.m.

HOW ABOUT THAT PROSPECTIVE MEMBER? HAVE YOU CALLED HER? HAVE YOU WRITTEN TO HER? DO IT BEFORE THE NEXT MEETING!!

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ASME Machine Design Division Meets February 8 in Milwaukee

The National Machine Design Division of the ASME will meet in Milwaukee February 8, 1950, and WSE members and friends are invited to attend.

The divisional meeting, sponsored by the ASME Milwaukee Section, will have its headquarters at the Hotel Schroeder for the one-day session.

Guests will register at 8:30 a.m. at the hotel, and an inspection trip to the Nordberg Manufacturing Company will begin at 9:30 a.m. Busses will leave the hotel at 9:10 a.m.

Luncheon will be held in the Crystal Ballroom of the hotel at 12 noon, with Thomas S. McEwan, vice-president of the Wolf Management Engineering Company, Chicago, presiding. James D. Cunningham (WSE), president of the ASME and president of Republic Flow Meters Company, Chicago, will greet the guests, and there will be a short message from Colin Carmichael, chairman of the Machine Design Division of the ASME, and editor of *Machine Design*.

After a welcome from George Mini-berger, chairman of the ASME Milwaukee Section, the featured address will be presented by Joseph B. Armitage, ASME director-at-large, and vice-president of Kearney & Trecker Corp., Milwaukee, Wisconsin.

The afternoon program will consist of a panel discussion on the subject, "The Influence of Customer Demands and Suggestions on the Design and Performance of Capital Goods," and a second panel will discuss the subject in the evening.

A social hour sponsored by a group of Milwaukee industries, will be held at 4:45 p.m., and guests will have the dinner hour free for their own plans.

A ladies' program will be held concurrently with the evening panel discussion.

Reservations should be sent to Prof. J. G. Van Vleet, University of Wisconsin in Milwaukee, Milwaukee 3, Wisconsin. Luncheon is \$3.75, and the inspection trip bus fare is \$1.00.

Ceiling Heat Gaining, Says Speaker

The popularity of ceiling installations of panel heating is cutting down the long lead enjoyed by floor panel installations, according to Harold A. Lockhart, chief engineer of the Bell & Gossett Co., who spoke January 9, before a meeting of WSE.

While both types of installations have proven satisfactory, he said the ceiling location has benefited from two recent developments: (1) a method of installing tubing above metal lath, economizing on plastering costs and avoiding the

necessity of imbedding tubes directly in the plaster, and (2) the discovery that the efficiency of floor panel systems is greatly reduced when rug pads of $\frac{5}{8}$ in. thickness or more are used.

Floor panel systems will continue in wide use, however, particularly in industrial buildings, he predicted. The reason is that ceiling coils should always be buried in plaster, Portland cement, or concrete—a type of roof construction that is more expensive than that commonly employed in factories.

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The Banker, the Engineer And the Contractor

(Continued from Page 5)

banker feels that he needs security, the risk is probably an undesirable one. A chattel mortgage on a contractor's equipment isn't generally desirable, and an assignment of contract proceeds is of doubtful value if the contractor gets into trouble and the sureties assert the rights which they claim under their bond applications.

Because of the inherent credit risks and the service required, higher interest rates are justified than in many other credit lines. And the contractor shouldn't feel too badly if occasionally he has a deposit balance with his banker instead of the possibility of an overdraft if the estimate check doesn't come in promptly. Remember, the money the banker has to lend comes from deposit balances.

A review of the causes of losses that we have had indicates that very often they spring from factors not directly related to the contractor's operations as such, but often had their roots in unwise financial ventures outside the contracting operations. Don't be tempted to tie up working capital or profits in specu-

lative real estate equities. Consult your banker before diverting money from your business into other fields.

It is fair to say that a careful check of the records of our bank for twenty years shows that losses on loans to contractors have been no greater than in other fields. Sometimes when the contractor is 12% to 15% low on a sizable job, the banker may wonder if the prophecies of disappointed bidders may be true, that "the so-and-so can't do it for that." However, such jobs often challenge all of the contractor's energy and attention, with better results sometimes than on jobs that are permitted to run themselves because the contractor feels so sure that the jobs will show a profit.

The contractor who is honest and competent and who counsels with his banker in any important moves affecting his financial affairs, will deserve and usually receive the full support of his banker so long as there is a reasonable prospect for his survival. And the banker who understandingly and intelligently attempts to assist his contractor customer will minimize his losses in comparison with the one who runs for cover at the first sign of a cloud in the sky.

It is a pleasure to do business with contractors. They are generally rugged

individuals. They cannot be dealt with according to fixed standards or formulas. They operate in a field that offers attractive rewards for courage and ability, and the banker who takes the time and makes the effort to understand the business and to analyze his contractor's problems will find a rewarding field of activity.

Personals

W. A. Wood, president of Aetna Ball and Roller Bearing Company of Chicago, has announced the appointment of J. J. Rozner as works manager.

Mr. Rozner joined the company's engineering department as a draftsman 21 years ago and has been chief engineer for the past 10 years—a post he will continue to hold together with the supervision, as works manager, of all manufacturing operations.

In announcing the appointment, Mr. Wood explained that the position has been vacant since the war's end but has been reinstated as a result and in furtherance of the company's current expansion program, the building and equipment—modernization phases of which have just recently been completed.

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WSE Applications

In accordance with the By-laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Junior, Member, Associate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admission, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office, 84 E. Randolph St., RA ndolph 6-1736.

- 267-81 Edward E. Varnum, Contracting Engineer & Cost Expert, Chicago Bridge & Iron Co., 332 S. Michigan Ave.
- 268-81 P. B. Garrett (Rein.); Editor, Electric Light & Power, Electrical Publications, Inc., 360 N. Michigan Ave.
- 269-81 Josef-Marion Gutnayer, Assistant Professor in Architecture, University of Illinois, Navy Pier.
- 270-81 Joseph F. Barbieri, Jr., 520 Austin Ave., Park Ridge, Ill., attending Northwestern University.
- 271-81 Richard N. Congreve, 1528 E. 69th Pl., attending Northwestern University.
- 272-81 George L. Martin, Engineer, Illinois Bell Telephone Co., 212 W. Washington St.
- 273-81 John B. McGuire, Development Engineer & Owner, T. W. Morris Trimming Machines, 6301 Winthrop Ave.
- 274-81 Edward C. Wage, Scientific Instrument Man, Podbielniak, Inc., 351 E. Ohio St.
- 275-81 Eugene R. Wallworth, 2724 N. Lehmann Ct., attending Illinois Institute of Technology.
- 276-81 Allan Lindsay, Assistant Supt. of Power, Public Service Company of Northern Illinois, 908 Clark St., Evanston, Ill.
- 277-81 Quigley Fletcher, Engineer-Field & Office; DeLeuw, Cather & Co., 150 N. Wacker Dr.
- 278-81 Robert W. Hutchinson, Safety Engineer, Marsh & McLennan, Inc., 231 S. La Salle St.
- 279-81 George G. Lamb, Professor of Chemical Engrg., Northwestern Technological Institute, Evanston, Ill.
- 280-81 Robert F. Rychtik, Draftsman, Commonwealth Edison Co., 72 W. Adams St.
- 281-81 Kenneth V. Glentzer, Radio & Special Services Engr., Illinois Bell Telephone Co., 208 W. Washington St.
- 282-81 George H. Pope, III, Assistant Secretary, Underwriters' Laboratories, Inc., 207 E. Ohio St.
- 283-81 William J. Spencer, P.B.X. Repair Foreman, Illinois Bell Telephone Co., 212 W. Washington St.
- 284-81 Charles R. Miller, Supt. Water & Electric Dept., Village of Winnetka, Village Hall, Winnetka, Ill.
- 285-81 J. Richard Wessling, Vice President, Electric Supply Corp., 705 Jackson Blvd.
- 286-81 Clarence J. Gauthier, Engineer, Public Service Company of Northern Illinois, 1001 S. Taylor, Oak Park, Ill.
- 287-81 Fred T. Sonne, Vice President, Chicago Aerial Survey Co., 332 S. Michigan Ave.
- 288-81 Carl B. Whyte, Chief Construction Engineer, Universal Oil Products Co., 310 S. Michigan Ave.
- 289-81 William A. Koch, Director, Property Ledger Div., & Cons. Engr., The Lloyd-Thomas Co., 4411 Ravenswood Ave.
- 290-81 Edward A. McMullen, Structural Engineer, Western Electric Co., Hawthorne Station.
- 291-81 Harold M. Porter, Application Engineer, Westinghouse Electric Corp., 20 N. Wacker Dr.
- 292-81 John A. Lange, Assistant Manager, J. L. Simmons Co., Inc., 185 N. Wabash Ave.
- 293-81 Alexis A. Stepanov, Consul of France, French Government, 919 N. Michigan Ave.
- 294-81 Patrick J. Lucey, Manager, Holy Sepulchre-All Saints Cemeteries, 6001 W. 111th St., Worth, Ill.
- 295-81 Lydon Lesch, Executive Vice President, L. J. Sheridan & Co., 111 W. Washington St.
- 296-81 William W. Stroby, Transitman, DeLeuw, Cather & Co., 150 N. Wacker Dr.
- 297-81 Harold G. Creamer, Power Engineer, Public Service Company of Northern Illinois, P. O. Box 278, Glencoe, Ill.
- 298-81 Evar E. Elm, Engineer, Cook County Inspection Bureau, 175 W. Jackson Blvd.
- 299-81 Emanuel M. Gordon, Owner, 1136 S. Kedzie Ave.
- 300-81 Leonard Wolpoff, 349 S. Kildare Ave., attending Illinois Institute of Technology.
- 301-81 Gordon W. Fehr (Rein.), District Plant Engineer, Illinois Bell Telephone Co., 131 N. Franklin St.
- 302-81 David J. Garlick (Trsf.), Junior Engineer, E. R. Gritschke, 11 S. La Salle St.
- 303-81 R. L. Doerrfeld, Chief of Apparatus Dev., Teletype Corp., 1400 Wrightwood Ave.
- 304-81 Miss Catherine W. Fiden, Engineer, Illinois Bell Telephone Co., 212 W. Washington St.
- 305-81 Rolf H. Jensen, 2621 W. 102nd St., attending Illinois Institute of Technology.
- 306-81 Donald B. Davidson, Jr., 3236 S. Michigan Ave., attending Illinois Institute of Technology.
- 307-81 Robert L. Rothschild, Production Manager, Consolidated Book Publishers, 153 N. Michigan Ave.
- 308-81 Chester W. Schirmer, Inspector, Missouri Inspection Bureau, 1330 Pierce Bldg., St. Louis 2, Missouri.
- 309-81 Arthur C. Carlson (Trsf.), Building Engineer, Illinois Bell Telephone Co., 208 W. Washington St.

Reviews of Technical Books

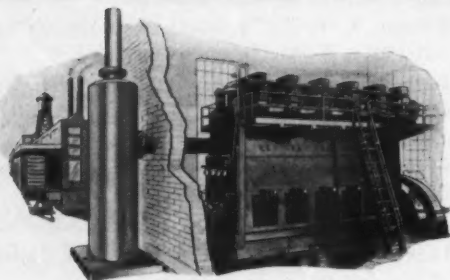
Electrical Engineering

Two-Dimensional Fields in Electrical Engineering, by L. V. Bewley. The MacMillan Co., 1948. 204 pp. \$5.50.

In an attempt to simplify the subject and possibly to make it more palatable for undergraduate engineering students, the author presents a treatment of field theory reduced to two dimensions. This is, of course, accomplished by assuming symmetry about one axis and naturally limits the usefulness of the method. However, as the author points out, many engineering problems do involve such symmetry and there is some justification for the shorter form in an introductory course.

The treatment given is conventional and includes discussions of flow fields, conformal mapping, images and flux plotting. The final chapter considers mechanical forces in electromagnetic systems, and in a brief appendix an introduction to the use of analog models is given.

W.F.L., WSE.



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Power Engineering

Steam, Air and Gas Power, by William H. Severns and Howard E. Degler, John Wiley and Sons, Inc., New York City, 1948, 509 pp. \$4.75.

In presenting this fourth edition of a well-established textbook which has been used in over 100 colleges, the objectives of the authors are, "to bring the material, together with illustrations and descriptions, abreast of present day development of fundamental heat power equipment; to make the material more easily understandable by rearrangement of the subject matter; and to introduce distinctive new material which appears to be of immediate and growing importance." While primarily intended as a textbook for undergraduate engineering students, the book will be of particular value to engineers who wish to review the subject in general or certain phases of power production, or to consider recent trends in this broad field.

The book is principally descriptive of modern power apparatus and correlated equipment such as boilers, steam engines and turbines, steam generator auxiliaries, feed water and draft appurtenances, condensing equipment, pumps, air compressors and internal combustion engines. Included under new material are the relatively recent developments of the gas turbine. Equipment presented and illustrated covers typical products of American manufacturers.

E.B., WSE.

Timber Design

Modern Timber Design, Second Edition, by Howard J. Hansen, John Wiley & Sons Inc., New York City, 1948. 312 pp. \$4.50.

This book was written to serve as a textbook for engineering students, and also as a guide and reference for practicing engineers. The material in this second edition is in conformity with the specifications recently adopted by the National Lumber Manufacturers Association.

The theory and practice of the design of wood beams, columns, trusses, trestles, bridges and decks are given in a logical and thorough manner, with numerous examples of design problems worked out in detail. Chapters are also given on glued laminated construction, plywood, and decay and preservatives; also, characteristics and properties of wood, grading rules, testing methods, and fastenings.

The appendix gives tables of sizes and patterns of boards and timbers, terms used in grading lumber, and standard lumber abbreviations.

Engineers dealing with the design of timber structures will find this a valuable reference book.

H.F.W., WSE.

Industry in War

Battlefronts of Industry—Westinghouse in World War II, by David O. Woodbury, John Wiley & Sons, Inc., New York, Chapman & Hall, Limited, London, 1948. 342 pp. \$3.50.

This is a dramatic resume of Westinghouse's wartime achievements and is representative of that of all American industry. It tells of the transition of industry from peacetime operation to production for war. This book serves as an historical account of the problems encountered in the manufacture of new and complex products in vast quantity and the adaption of peacetime products to the operating conditions of war. The production of intricate precision equipment with personnel unaccustomed to this type of work, and the problems associated with mass production during periods of development when designs and specifications were constantly changing, are presented for a wide variety of products. G.H.A., WSE.

Electromechanical Systems

Electromechanical Transducers and Wave Filters, by Warren P. Mason. 2nd Edition. D. Van Nostrand & Co., 1948. 419 pp. \$6.00.

The first edition of this work (1942) contained a thorough theoretical treatment of electromechanical systems as used in the communications industry. In brief recapitulation, it covered electrical network theory, acoustic networks, diaphragm vibrations, electromagnetic to mechanical conversions and piezoelectric phenomena.

In the present second edition, 82 pages of new material have been added, some of which is the result of war time developments. Topics included in the new section are: waveguides, electromagnetic prisms, gyroscope applications to electromechanical systems, acoustic properties of cylindrical tubes and electrostatic driving mechanisms.

Written in the familiar precise and thorough style of Bell Laboratories publications, this book can be considered as a basic standard text on its subject.

W.F.L., WSE.

History of Engineers

Saga in Steel and Concrete, by Kenneth Bjork, Norwegian-American Historical Association, Northfield, Minn. 1947. 504 pp. \$4.00.

This is an account of Norwegian engineers in America. Sketches are given of a great number of engineers, born and educated in Norway, who migrated to America to follow their profession. Many of them are known personally, or by reputation, by Chicago engineers.

It is a story of the role of Norwegian engineers in the development of bridges, tunnels, skyscrapers, machines, chemical processes, and industrial techniques that have helped to shape the life of America.

The author also deals with the broader questions of immigrant transition—the social life of educated immigrants in urban communities, their professional organizations, and their attitude to the problems of the democracy of which they became a part.

Any engineer, whether of Norwegian origin or not, will find this to be an extremely informative and interesting book.

H.F.W., WSE.

Electricity

Electric Distribution Fundamentals, by Frank E. Sanford, McGraw-Hill Book Company, New York, 1947. 252 pp. \$3.50.

Among the steady flow of books designed for specialists, it is sometimes a relief to find one designed to sum up and review the progress made in a wider field. This book does just that, in a thorough, straight-forward manner, giving a review of such fundamentals as apply to the subject and carrying through into practical problems.

It should be of particular value to an engineer who feels the need of a course beyond his specialty. And it can well be used by anyone wishing to extend his knowledge into this subject.

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The book is well-indexed, the problems are practical, and the mathematics are kept at a high school level.

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